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ART. I.—ANATOMY OF THE BRAIN.—(Continued.)

Having thus glanced at the outlines of Cerebral Anatomy and methods of estimating cerebral development, let us look at the more intimate structure of that wonderful apparatus in which mind and matter come into the most intricate and extensive correlation. The nervous matter, or Neurine, is composed of two different substances, distinguished as the white and grey—the medullary and cortical, or fibrous and pulpy. The former (the white, fibrous medullary substance) is composed of fibres, which appear under the microscope to be tubes or canals filled with a gelatinous, nervous substance, much softer than the walls of the vessel in which it is contained. The tubular substance and the neurilemma, or investing membrane of each fibre, give considerable firmness to this portion of the nervous structures. Hence it is an easy matter to show the fibrous structure, by dissecting the medulla oblongata, pons varolii, or any other part that is conveniently accessible. Nevertheless, this fact was stoutly denied by anatomists, when Gall and Spurzheim first urged the fibrous character of the white substance. So stubborn was the conservative party against all improvement, this palpable fact was assailed as a mere trick or deception, and Dr. Spurzheim was compelled to verify his assertions by public dissections of the brain.

The white fibres, or nerve tubes, constitute the principal portion of the spinal cord and nerves. They constitute, also, the crura of the cerebrum, the expansions of the crura which form the interior of the convolutions, and the commissures which connect the opposite hemispheres. The interior of the cerebellum and its commissure, the pons varolii, are also formed of the white fibre.

The grey, pulpy substance, covers the exterior of the cerebrum and cerebellum, and occupies certain positions in the interior of the cerebrum and spinal cord, from which white fibres originate. Wherever the grey matter is located, it appears to give origin to white fibres, and hence was regarded by Gall and Spurzheim as their matrix or generator.

The fact that white fibres thus appear to originate in the grey substance, from which they run continuously to their distributions in the body (or, to express it differently, the fact that, when we trace the fibres of our various nerves to the brain, these fibres finally plunge into the grey substance at its surface, with which they become incrusted, as the roots of a tree become implanted in the earth), would seem to indicate that the white fibres or tubes were designed to act as channels of communication from the brain to the muscles and external senses, and between the right and left hemispheres of the brain. The tubular structure, and the existence of a soft, nervous substance in the interior of the tubes, adapted to the most delicate vital functions, indicate a conducting power in these fibres; and as it is well known that the white fibre of our muscular nerves simply conducts an impulse to the muscles, while the white fibre of our sensitive nerves simply conducts an impression upon the organs of sense to the brain, we cannot doubt that the white fibre in the brain performs the same conducting office as its continuous connections in the body.

Thus we perceive how the various intellectual and emotional organs (the convolutions of the cerebrum), having these channels of communication with all parts of the body, are enabled to control all the movements and modify all the vital actions of the body, as well as to recognize all impressions upon the sentient extremities of the nerves.

It is an important fact, verified by the microscopic observations of almost every observer who has given any attention to this subject, that these nerve tubes or channels have no connection with each other, but that each has an entirely distinct, independent course between the brain and the muscle, or organ of sense in which its function is displayed. The decisive statements of Fontana, Prevost, Dumas, Muller, Valentin, Ehrenberg, Carpenter, Solly, and many other eminent anatomists, leave not the least doubt that our nervous system of white fibre is a system of continuous, independent channels, which never mingle or anastomose together like blood-vessels, but preserve a perfect distinctness of function, no matter how close together or how small the nerves. The most delicate nerve that we can trace by the naked eye, may contain distinct fibres, one conveying motor commands to a muscle, and another conveying sensations to the brain.

The size of these fibres, which is generally the two-thousandth or three-thousandth of an inch, varies according to their position and the delicacy of their function. The fibres of the nerves of the senses are finer than those of the muscular nerves, and the finest of

all are those which lie in the convolutions connecting with the grey substance, especially in the intellectual organs. Fibres as small as the ten, twelve, or fourteen-thousandth part of an inch in diameter, have been recognized in the brain, while the muscular nerves of the body rise to the two-thousandth or even one-thousandth of an inch.

The existence of these specific channels, connecting certain portions of the brain and corresponding portions of the body, shows that the connection of the mind with the body is not a matter of vague and indefinite relation, but an exact connection, correspondence and sympathy, the details of which have been explored by neurological experiments.

The function of transmission being assigned to the white substance, the power which is transmitted is believed to originate in the grey, which connects with, or surrounds, the central ends of the white fibre. Indeed no other theory could be admissible after we have determined transmission to be the function of the white fibre, for there can be no other location for the nervous functions.

In accordance with this pre-eminent importance of the grey substance, we find that it is much more liberally supplied with blood than the other nervous tissue, and, indeed, presents the appearance of a mere tissue of very fine blood-vessels, in the meshes of which a peculiar nervous pulp is contained. This nervous pulp is of a granular and globular character—the fine granular substance lying at the extreme superfices of the brain, and the ganglion-like globules lying a little deeper. Those vesicles or globules which lie a little way from the surface, become covered with granular substance, and have a filamentous sheath. They are also frequently characterized by a caudal prolongation, extremely delicate, by which the vesicles or globules connect either with other globules or with the cylindric fibres of white substance.

This structure presents a great analogy to the organs of secretion, in which certain cells or vesicles, in contact with a fine network of blood-vessels, form a secretion, which is discharged by the excretory ducts. In like manner, the nervous vesicles appear to be placed in contact with a set of vessels conveying arterial blood, and in communication with the white fibres or ducts by which the nervous influence is conveyed to the various parts of the body.

Here, then, are the ultimate facts of our conscious existence, so far as they can be traced by anatomy. The seat of the mental phenomena appears to be in this vesicular and granular substance, situated and acting as a gland, of which the white nerves are the efferent ducts. Indeed, the analogy of structure between the brain and the kidneys is quite striking.

These globules, which are of a spheroidal or oval form with a filamentous investment, are from the three-hundredth to the twelve-hundred-and-fiftieth of an inch in diameter, and are incalculably numerous. Whether their number bears an exact relation to the mental power has not been a subject of investigation,

but we may presume that as the grey matter wastes when the organs are inactive, and is sometimes remarkably deficient in the brains of idiots (while on the other hand, in men of talent, it is developed over a much more extensive surface of convolutions), that the supply of globules in connection with the supply of arterial blood, is the criterion of the cerebral power. The globules of the brain are probably as essential to the display of the mental power, as those of the blood are to the general manifestation of life—to which they are so essential, that whenever their amount is reduced from one-eighth to one-ninth of the mass of the blood, general debility is produced.

The presence of nervous globules is not confined to the brain, as they are also found in the grey matter of the spinal cord, and in the ganglia of nervous matter which preside over the unconscious functions of digestion, secretion, circulation, &c., and in each of these situations are regarded as the source of nervous power which they impart to the delicate filaments of their caudal prolongations. (The nervous filaments which they thus originate in the ganglia of the body, are different from the white fibres before mentioned; but according to the recent researches of Kolliker and others, they do not differ essentially, but rather consist of the interior substance of the white fibres, unprotected by the firm tubular investment.)

With this exposition of our nervous organs, consisting of an immense number of spheroidal globules and conducting tubes, the former depending for their energy upon the supply of blood, we perceive that the cerebral circulation is no less important than the arrangement of the grey and white *neurine*.

The brain lies within the cavity of the cranium, which it compactly fills. In addition to the nervous substance of the brain, we find membranes, blood-vessels, and the blood which they contain, with a small quantity of watery fluid in the cavities of the brain called ventricles.

Peculiarities of the Cerebral Circulation.—The brain is supplied with blood by large arteries (the vertebral and the carotid), in which the force of the impulse of the blood is mitigated, by the fact that the blood flows upward through crooked channels, and that the ramifications of the arteries of the head being slightly more capacious than their principal trunks, the blood is thereby caused to flow a little slower. This partly protects the brain from the pulsating force of the blood thrown from the heart. It is stated by eminent pathologists, that disease of the brain (as apoplexy and softening of the cerebral substance) is sometimes favored or caused by hypertrophy of the heart, which increases the force of the impulse of the blood. When the left ventricle of the heart is much increased in bulk, the brain, as well as other organs, feels the increased force of the pulsation of the arterial blood which is thrown from the left ventricle to all parts of the body. The brain, being inclosed in a solid cavity, cannot expand or vary its dimensions to accommodate itself to any change of the circulation, and

hence is more powerfully affected than other parts of the system by changes in the action of the heart. If the afflux of blood to the brain be diminished, its functions are immediately impeded or arrested, and we have a swoon or fainting fit. If the cessation be sufficiently prolonged, death ensues. Hence, the pressure of the rope in hanging would be fatal, even if it did not compress the wind-pipe and obstruct respiration. Mountebanks, in ancient times, availed themselves of this principle to make a striking exhibition. A goat would be brought upon the platform, and made, at the command of the juggler, to lie down and die. The arteries of the neck had previously been secured in ligatures, and by secretly tightening these, the brain was deprived of its circulation of blood and unconsciousness produced. The animal was restored by loosening the ligatures, and, recovering its consciousness, rose again to its feet. When the circulation of the brain has been violently deranged, as in epilepsy, the expedient has been successfully adopted, of tying the carotid arteries, so as to diminish the amount of blood flowing to the brain.

As the arterial blood is, in all the organs of the body, the source of their power and activity, so, in the brain, the action of every organ is dependent upon its supply of arterial blood. Hence, when the increased action of the heart sends an unusual supply of blood to the brain, the power of all the organs is greatly increased. Thus in fever, the mind often becomes very active and brilliant, rising above the usual level of its powers, even into poetry, music and eloquence. The idiot, or imbecile, has sometimes thus been exalted to the level of rationality. As the increased action of the heart thus rouses the brain, so do certain mental excitements, operating through the brain, affect the heart and arteries so as to increase the cerebral power. Fear, for example, operates upon an organ located on the temporal bone, which excites the heart to violent palpitating action, and thus sends forth a rush of blood which, for the moment, powerfully stimulates the nervous system. This mode of excitement, however, is not the best for the general cerebral action. Emotions of a higher character than fear produce a much better state of the circulation to bring forth the energies of the brain. General mental excitement, as in public speaking, produces a great determination to the brain, manifested by the throbbing arteries, flushed countenance and heated head. The exertion of any special portion of the brain produces a local determination and warmth, which may often be felt externally.

Whatever interrupts the flow of the blood through the brain, diminishes the power and activity of the organs, tending to arrest entirely the mental action, and produce a sleepy or a comatose condition. Thus, a tight cravat, or any position which compresses the blood-vessels of the neck, may produce an oppressive dullness. The distension of the blood-vessels of the brain, which occurs in apoplexy, or the effusion of blood by a rupture of the blood-vessels, obstructs the circulation by compressing the brain to

such an extent as to render the individual entirely unconscious. In like manner a morbid or excessive growth of the brain (hypertrophy) sometimes occurs, which fills the cavity of the cranium so compactly as to impede the circulation and oppress the mental functions. Languor, or inactivity of the cerebral circulation, is usually owing to the absence of mental excitement; and when this habit of mental inactivity has been established for many years, the blood-vessels become so entirely accommodated to that condition as to be incapable of accommodating themselves to a state of high mental excitement, and thus the mental powers are limited by physical degeneracy.

Physiologists are accustomed to speak of a *determination to the brain*, and the idea is entertained by many that the *quantity of blood* in the brain is increased or diminished, according to the increase or decline of this determination or excitement. But, the truth is, the solid inclosure of the brain by the skull places it in a different condition from any other organ of the human body, and it is not possible to produce any material change in the quantity of blood in the brain, unless the skull should be forced open, or unless, in a very gradual manner, the growth of the cranium should make room for a greater amount. It is true that, when a determination to the brain exists, it is stimulated by a greater quantity of blood, because the blood circulates more rapidly. But the increased action is owing entirely to the rapidity of the circulation—not to the quantity of blood present at any moment, in which there is no material change.

Yet, although the whole brain is not capable of materially increasing or diminishing its supply of blood, the individual portions of the brain may undergo as great variations in their supply as the organs of the body. The blood-vessels of any part may expand and admit an increased quantity of blood, or contract so as to paralyze the action of the organ; but in all cases the expansion of blood-vessels, and increased supply of blood in any portion of the brain, is at the expense of other portions, in which the amount of blood is proportionally reduced.

There have been some differences of opinion among physiologists, and some confusion of thought upon this subject, in consequence of their overlooking the fact, that the cranium is incapable of expansion, and consequently, when full, cannot receive any greater amount of blood. Hence, a greater quantity in any portion of the brain, necessarily implies a smaller quantity in other portions.

A knowledge of this very important physiological law, which has heretofore been overlooked, is indispensably *necessary* in explaining the action of the brain. By means of this law we understand many phenomena of mental excitement and education which cannot be otherwise explained, especially in the changes of character which are produced by peculiar circumstances.

The healthy and well-balanced action of the brain is accompa-

nied by a certain uniformity and equality in the distribution of the blood through all its parts, by which all the organs are kept in a state of activity, and caused to exercise an influence upon the character, proportional to their development. While this equilibrium is maintained, the whole brain manifests more or less activity, as its circulation increases or diminishes in rapidity; but when any organ is roused by an influence bearing exclusively upon itself, then we see exemplified that law of physiology which has been expressed by the old phrase, "*ubi irritatio, ibi afflluxus*," wherever the irritation or excitement exists, there the flow or afflux concentrates. Thus, if we sit down to study some mathematical or metaphysical problem, the excitement is addressed merely to the front lobe, and, in proportion to the intensity of our study, does the front lobe become excited and its capillary circulation expanded; while other portions of the brain, and especially those lying on the opposite side of the head, become inactive, compressed and deficient in their usual supply of blood. Thus does the intense excitement, or the continued exertion of any portion of the brain give it an undue predominance, and, for the time, enfeeble all other organs. He who has been for several hours engaged in hard study, has materially diminished the fullness of circulation and organic activity of the occipital and basilar organs.

In like manner, he who has been exercising the superior or coronal organs, cultivating the affections in refined society, has, for the time being, subdued the activity and power of the basilar organs. Hence we find, that those who habitually cultivate the intellectual and moral faculties, at the same time subdue their animal passions, and become incapable of acts of violence. Men of highly cultivated intellect are generally sufficiently redeemed from the influence of the basilar region of the brain, to prevent the possibility of their being guilty of any very great crime. The great majority of criminals are generally very ignorant, uneducated men. A purely intellectual education, although it may not sufficiently rouse the moral sentiments, necessarily diminishes the force of the lower occipital organs by diverting the excitement to the front lobe, and thus diminishes the tendency to crime; or at least reduces the animal passions, so as to render them more controllable by reason and the moral sense.

It is rare to find a woman guilty of any high crime or act of violence, because so large a portion of her life is occupied in the exercise of the affections—in acts of kindness and devotion to her family; and it often happens, that, by the intense excitement of her affections, the animal organs are so cramped and paralyzed, as greatly to impair her vital power. We know the debilitating influence which is often produced in a refined constitution by severe agitation of the affections. The loss of energy, the wasting debility and swooning which so frequently occur in delicate females, when their affections are deeply agitated, illustrate the principle, that when any portion of the brain is over-excited or congested, the

opposite region becomes compressed and partially paralyzed as to its functions.

The same principle is no less forcibly illustrated in the exacerbations of the animal passions. When the basilar organs are large, for example, an insult or injury, which arouses Combativeness, frequently excites so powerfully the circulation in the basilar portion of the brain, as to compress the organs of the frontal and coronal regions, and paralyze for the time the action of Reason, Benevolence, Religion, Justice and Affection. He, in whom the lower occipital region of the brain is very highly excited, is generally incapable of exercising much kindness, liberality, justice or sense of religious duty, until the excitement has been removed. The man who is in a violent passion, is not only rude, unkind and void of sympathy, but incapable of being influenced by reason, or obeying the best dictates of intellect; yet, when the excitement has subsided and the circulation of the brain become equable, he is again capable of reasoning, sensitive to wrong, and disposed to repent his previous rudeness.

In a constitution of general stamina and vigor, governed by the region of Firmness and Health, the steadiness and regularity of the cerebral circulation prevents this access of passion and deviation from health. The man of rightly organized constitution does not yield to the excitement of any passion or emotion, but preserves at all times an equable circulation in the brain, a vigorous action of the intellect, and a due predominance of the moral sentiments. On the other hand, those in whom the superior posterior region of the brain is deficient, not having this vital tone or stamina, yield readily to various excitements, run into absurd excesses and become the mere creatures of temporary circumstances.

The facility with which any region of the brain may acquire an increased fullness and development by local excitement, while other organs may be paralyzed or atrophied by habitual inactivity, explains the great power of education and society over the formation of character. No matter how defective any organ or group of organs may be, it is possible by a persevering course of excitement to rouse it into activity.

In like manner, it is possible to paralyze the largest development which we may inherit from our parents. The largest intellectual developments avail but little to the overtasked laborer, who has been deprived of all means of instruction; while, on the other hand, persons of the most meagre intellectual developments become decidedly intellectual and possess rich stores of knowledge, through the influence of a thorough and efficient intellectual education. In like manner, we observe that a large development of the Love of Stimulus, inherited from intemperate parents, may be rendered nugatory by a strictly temperate life; while the man of a strictly temperate constitution, naturally averse to ardent spirits, if once led by other motives to indulge freely in his potations, acquires the drunkard's thirst and becomes a confirmed sot.

In all these cases a new condition of the cerebral circulation is established. The vast net-work of capillary blood-vessels in the excited organ becomes expanded by an increased supply of arterial blood. And while this is occurring, we know, with mathematical certainty, that other portions of the brain are diminished in circulation and impaired in function. Thus does education exert the power of essentially changing the form and condition of the brain. The over-excited organs not only expand in consequence of the increased supply of blood, but receive additional nourishment and growth, which gives them a paramount ascendancy over their diminished antagonists. The gradual absorption of the inactive organs, according to the general law of physiology, which applies to all parts of the body, completes the change in the structure of the brain.

The power of one portion of the brain, under local excitement, to suppress or restrain the functions of other portions, is highly important in reference to the mutual antagonism and co-operation of the cerebral organs. Neurology demonstrates, that every cerebral organ is balanced by an organ of the opposite function, so as to complete the symmetry of the human character, and give us an unlimited freedom of action in every direction. These opposite tendencies, the recognition of which is essential to a just conception of the human mind, are located in opposite regions of the brain; and as the exercise of any function or faculty naturally tends to over-rule or suspend its opposite, so do the organs of opposite faculties, by their position and mechanical relations in the brain, counteract each other and exercise a mutual restraint.

A large portion of the philosophy of man is, therefore, explicable by reference to the mechanical constitution of the brain, and the hydraulic laws of its circulation. In discussing the functions of particular organs, I propose to show how the application of the hydraulic laws explains the correlation and reciprocal influences of the organs. At present, as it would be premature to present all the relations of particular organs, I would merely state the principal hydraulic laws of the brain, which are at the foundation of many highly important laws of the mind:

First Hydraulic Law.—The excitement and expansion of any portion of the brain, tends to produce a proportional compression and restraint of the opposite portion.

This is an obvious consequence of the simplest principles of mechanics. If we press upon a soft viscus inclosed in a firm cavity, the pressure will necessarily be transmitted chiefly to the opposite point of its surface. If we press from above, the pressure will be principally felt upon the bottom; if from below, it will principally be felt upon the upper surface. The opposite region of the brain, which is thus compressed, is generally the special opposite or functional antagonist of the one by which it is compressed. Thus does the excitement of every organ increase its power, by suppressing, at the same time, all influence that would tend to counteract it.

Second Hydraulic Law.—The organs immediately adjacent to the one which is subject to any strong excitement, are also liable to compression. Hence, the strong excitement of any faculty or passion not only antagonizes the passion or faculty of an opposite character, but equally checks the development of those which are most similar.

The application of these two hydrostatic laws, in the consideration of special organs, furnishes a beautiful and interesting illustration of the connection between mental phenomena and our physical constitution.

The concentration of excitement in any part of the brain may arise from various causes. The most usual cause is the presentation of the appropriate object to the organ, as when Combativeness is roused by an injury, or Fear by an impending danger. When the cerebral circulation becomes morbidly irregular, so as to manifest violent excitement, independent of all external influences or motives, we regard the mental condition as unsound or insane. When, on the other hand, it is impossible to produce too high or predominant an excitement of a particular passion, we ascribe this condition to a predominance of Firmness and Health over the sensibility and excitability of the constitution. When the nervous system is highly predominant, and its sensibilities have attained the highest degree of acuteness, we are not only powerfully affected by every motive suggested to our minds, but the brain is susceptible of being influenced by the most subtile causes. In other words, the temperament is highly impressible, and the application of the hand to the head will exert a sufficient influence to excite the subjacent organs into predominant activity. In this case it is probable that the cerebral circulation changes in accordance with the character of the excitement. The circulation may change with instantaneous quickness, and the most sudden revulsions in feeling, might be referred to changes in the circulation, through the immense ramifications of blood-vessels which occupy the superficial portion of the brain.

Changes in the mental condition are due, not only to a change in the rapidity or direction of the circulation, but to a change in the character or composition of the blood itself. When the blood is largely supplied with red globules, which give it the bright-red, arterial color, the action of all the organs is more prompt, vivid and vigorous. When these elements are defective, and the blood is of a pale, watery constitution, the mental as well as the physical organs operate more feebly. When any of the elements of the blood are absent, or developed to an undue extent, the action of the brain is in some degree modified, and the character, spirits and intellectual power, sensibly changed. Thus, when the blood possesses an excessive amount of the element called fibrin, which causes its coagulation, and which is similar in constitution to the muscular system, the influence of such blood stimulates the basilar, rather than the coronal and intellectual organs. On the other hand, when the

blood is defective in fibrin, so as to coagulate very feebly, it fails to stimulate the animal organs of the brain, and there is a deficiency of energy both in the mental and bodily constitution. When the blood becomes surcharged with carbon and carbonic acid, in consequence of indolent habits and imperfect action of the lungs and skin, the capillary circulation becomes more languid, and the whole action of the brain is enfeebled. When the hydro-carbonaceous elements of the bile, which should be secreted by the liver, are retained in the blood, they exert a prejudicial influence upon all the superior anterior regions of the brain, diminishing the intellectual and moral force, while they excite certain basilar organs which produce an irritable and melancholy temper. When the action of the kidneys is impaired so as to suspend their usual secretion of urea, this urea being retained in the blood, exerts a narcotic influence upon the whole brain, and finally reduces the patient to an insensible or comatose condition. So when the deranged action of the kidneys discharges a considerable amount of the albuminous elements of the blood, instead of their legitimate secretion, we find the brain injured by this change in its blood, and epileptic convulsions have frequently been observed as the consequence.

Thus every change in the composition of the blood produces corresponding changes in the action of the cerebral organs. Indeed, I have no doubt that, if vital chemistry were sufficiently advanced, it would be practicable to determine, from the composition of the blood, the condition of the organs of the brain.

Every cerebral organ, we may infer from several reasons, tends to produce a definite constitution of the blood; and it is certain that each organ tends to produce a certain condition of the cerebral circulation, some favorable and others unfavorable to a sound and healthy action of the brain. The basilar organs of the passions excite the muscular system, and produce a violent and irregular circulation in the brain, quite unfavorable to the action of the mental and moral powers. It is to be observed, that those organs which are most favorable to the ascendancy of the mind and the harmonious action of the brain, lie in the upper-half; while those which exert the most deranging influence, lie in the basilar region. There are many reasons for this arrangement, not necessary now to mention; but it is an obvious suggestion, that the organs in the basilar portion of the brain lie in contact with the large blood-vessels by which the blood enters the brain and is returned to the body. Hence, the action and expansion of these organs may easily derange the cerebral circulation, by compressing the arteries through which the blood enters the brain, or the veins through which it takes its departure. In the one instance, rendering the cerebral circulation slow—in the other, oppressing the brain by venous congestion; or, in case one class of vessels should be compressed while another class is relieved from compression, extraordinary inequalities in the circulation of the brain must be produced.

Thus do the organs in the basilar portion of the brain, in conse-

quence of its mechanical arrangements, exert a remarkable modifying and deranging power over the circulation; while the organs of the higher emotions, not being so situated as to interfere with the arterial influx or venous efflux of the brain, exert no such deranging influence, but preserve the mind in a calm and equable serenity.

Many of the phenomena of apoplexy, epilepsy, syncope, dreaming, trance, hysteria, &c., may be explained by reference to the position of the organs, and their mechanical influence upon the blood-vessels. Not only do the minute capillary blood-vessels change their condition under the influence of organic excitement and pressure, but the larger vessels, as the longitudinal and lateral sinuses, the carotid and vertebral arteries, and all their ramifications, hold the most interesting relations to the adjacent parts of the brain, by which they may be affected. It would be a work of great nicety and interest to trace the manner in which the cerebral organs propagate their influence mechanically through the brain, showing how any organ is thus enabled materially to assist or impede the functions of others, by modifying their circulation of blood.

This reciprocal influence is exercised partly mechanically, and partly physiologically. Each hemisphere of the brain exerts a physiological control over the opposite half of the body, and consequently over the opposite cerebral hemisphere, by means of which control it may determine the whole course of the circulation and nervous energy. Thns, whatever organ may be excited, the whole cerebral circulation is soon brought into accordance with its character, and all organs calculated to restrain its predominance are restricted in their circulation as much as those of a congenial character are assisted; while the remainder are modified in a peculiar manner, which can be understood only after we have studied the mathematical laws that govern these hydraulic phenomena.

The rigorous manner in which the changes of the cerebral circulation are controlled by the solid cranium is, perhaps, liable to a slight exception, arising from the facility of secretion and absorption. If the solid contents of the cranium do not undergo any change, it is obviously impossible to change the amount of the fluids. The solids are liable to slight and very gradual changes from the growth of active, or absorption of inactive, organs—but the fluids are liable to much greater and more sudden changes. The brain and spinal cord are regularly supplied with a limpid cerebro-spinal fluid, usually to the amount of two or three ounces, but sometimes even four or five times that amount, when, from old age or other causes, the cerebral substance is absorbed. This fluid is located around the convolutions, between the exterior membranes (dura mater and arachnoid) and the immediate investing membrane of the convolutions, the *pia mater*, and also in the interior of the ventricles. As this limpid secretion may be readily evolved or absorbed by the blood-vessels of the head, the changes which take place in its quantity give greater room for the blood when it is absorbed, and diminish the supply of blood when the serum is secreted in excess.

ART. II.—MESMERISM IN INDIA.

BY JAMES ESDAILE, M. D.

CHAPTER II.—(CONTINUED.)

ACCIDENT alone determined my choice, and decided the matter for me, perhaps much better than theory would have done; for I should as soon have thought of commencing operations on the first dog or pig I met on the road, as of selecting this man for his good mesmeric "materiel."

There are some interesting particulars in this first successful mesmeric experiment in India, to which I beg leave to direct the reader's attention.

I. The purely accidental and unpremeditated nature of the experiment.

II. All want of consent between the parties.

III. The operator's want of belief in his own power; for I had never seen Mesmerism, and all I knew about it was from scraps in the newspapers.

IV. The absolute ignorance of the patient; it being impossible that he should ever have heard of Mesmerism.

V. The impossibility, therefore, of imitating the mesmeric phenomena.

Under all the circumstances of the case, collusion between the parties, will not, I presume, be suspected; and every possible care was taken to exclude any source of fallacy in the experiment. European gentlemen, skeptical and critical, or so strong in disbelief that they would have reasoned themselves out of their senses, if they could: ignorant Hindoos and Mussulmen, who merely used their eyes and ears without an attempt at reflection, will all be found, by their separate and independent reports, bearing testimony to the same series of phenomena. As I might never succeed again, I endeavored to make this case as perfect as possible in all its parts, by bringing the senses of different people to bear upon it, in all its stages; and, I must say, that I cannot see any possible opening for mistake or deception. It has for many months been before the Indian public, who were invited to point out any source of error that may have escaped me, and no attempt has been made to disprove the facts, or explain them away, except by the easy and sweeping charge of imposition in the patient, and delusion in the observers—of the probability of which I shall now give the reader the means of judging.

FIRST EXPERIMENT.

Madhab Kaura, a hog-dealer, condemned to seven years imprisonment, with labor on the roads, in irons, for wounding a man so

as to endanger his life, has got a double hydrocele. He was ordered to be taken from the jail to the charity hospital, to be operated upon.

April 4th.—The water was drawn off one side of the scrotum, and two drachms of the usual cor. sub. injection were thrown in. On feeling the pain from the injection, he threw his head over the back of the chair, and pressed his hands along the course of the spermatic cords, closing his eyelids firmly, and making the grimaces of a man in pain. Seeing him suffering in this way, I turned to the native sub-assistant surgeon, an *eleve* of the Medical College, and asked him if he had ever seen Mesmerism? He said that he had seen it tried at the Medical College, but without effect. Upon which I remarked, "I have a great mind to try it on this man, but as I never saw it practiced, and know it only from reading, I shall probably not succeed." The man continuing in the position described, I placed his knees between mine, and began to pass my hands slowly over his face, at the distance of an inch, and carried them down to the pit of his stomach. This was continued for half an hour before he was spoken to, and when questioned at the end of this time his answers were quite sensible and coherent.

He was ordered to remain quiet, and the passes were continued for a quarter of an hour longer—still no sensible effect. Being now tired (thermometer 85°), I gave it up in despair, and declared it to be a failure. While I rested myself, the man remained quiet, and made fewer grimaces, and when ordered to open his eyes, he said there was a smoke in the room. This roused my attention, and tempted me to persevere. I now breathed on his head, and carried my hands from the back of his head over his face and down to the epigastrium, where I pressed them united. The first time this was done, he took his hands off his groins and pressed them both firmly down upon mine, drew a long breath, and said, "I was his father and mother, and had given him life again." The same process was persevered in, and in about an hour he began to gape, said he must sleep, that his senses were gone; and his replies became incoherent. He opened his eyes when ordered, but said he only saw smoke, and could distinguish no one; his eyes were quite lusterless, and the lids were opened heavily. All appearance of pain now disappeared; his hands were crossed on his breast, instead of being pressed on the groins, and his countenance showed the most perfect repose. He now took no notice of our questions, and I called loudly on him by name without attracting any notice.

I now pinched him, without disturbing him, and then asking for a pin in English, I desired my assistant to watch him narrowly, and drove it into the small of his back; it produced no effect whatever; and my assistant repeated it at intervals in different places as uselessly. His back had continued to arch more backward latterly, and he was now in a state of "opisthotonos;" the nape of his neck resting on the sharp back of the chair, and his breech on

the edge of it. Being now satisfied that we had got something extraordinary, I went over to the Kutcherry, and begged Mr. Russell, the judge, and Mr. Money, the collector, to come and see what had been done, as I wanted the presence of intelligent witnesses in what remained to do. We found him in the position I had left him in, and no hallooing in his ears could attract his attention. Fire was then applied to his knee, without his shrinking in the least; and liquor ammoniæ, that brought tears into our eyes in a moment, was inhaled for some minutes without causing an eyelid to quiver. This seemed to have revived him a little, as he moved his head shortly afterward, and I asked him if he wanted to drink; he only gaped in reply, and I took the opportunity to give, slowly, a mixture of ammonia so strong that I could not bear to taste it; this he drank like milk, and gaped for more. As the "experimentum crucis," I lifted his head, and placed his face, which was directed to the ceiling all this time, in front of a full light; opened his eyes, one after the other, but without producing any effect upon the iris; his eyes were exactly an amaurotic person's, and all noticed their lack-luster appearance. We were all now convinced that total insensibility of all the senses existed, and I ordered him to be placed on a mattress on the floor, and not to be disturbed till I returned. It was now 1 o'clock, the process having commenced at 11 A. M.

I returned at 3 o'clock, and was vexed to find that he had awoke, and been carried back to the jail hospital. The native doctor of the jail had come in; and on hearing that the Sahibs could not awake the patient, he set about doing so, and succeeded by throwing water on his face, &c. I again went to Messrs. Russell and Money, and requested them to accompany me to the jail, to be present when he was interrogated regarding his reminiscences; and we put down a series of questions to be put to him, at once, and without explanation. We found him looking well, with a lively expression of face, and the following questions were put to him; his answers being taken down at the same time:

Q. "How do you feel?" "Very well." Q. "Any pain in the throat, or elsewhere?" "A little uneasiness in the throat, no pain any where else." Q. "What has happened to you to day?" "I went in the morning to the Imbarah Hospital, to get the water taken out of my scrotum." Q. "Was the water drawn off?" "Yes." Q. "What do you remember after the operation?" "I went to sleep soon after, and remember nothing else." Q. "Did you eat or drink after the operation?" "I felt thirsty, but got nothing to drink till Kurreen Ali, the native doctor, awoke me." Q. "Did anybody prick or burn you?" "No, no." Q. "Did you smell any thing disagreeable?" "No." Q. "Were you happy when asleep?" "Very." Q. "Did you hear anything when you were asleep?" "I heard voices, but did not understand them." Q. "Did you see any gentleman in the hospital but me?" "No." Q. "Did you feel any pain in the scrotum after going to sleep?" "I felt none till I awoke." Q. "Any pain in that part now?" "A very little." Q. "How many

motions have you had to-day (he was suffering from chronic diarrhœa)?" "Four before going to the hospital, none since; belly is much easier than it has been for some time."

Having answered all these questions readily and frankly, he began to cry, thinking it was some kind of judicial investigation, I suppose.

"The above is an exact relation of what took place in our presence, and we are thoroughly convinced that there was a complete suspension of sensibility to external impressions of the most painful kind. (Signed) F. W. Russell,

"D. J. Money,

"Budden Chunder Chowdaree,

"*Sub-Assistant Surgeon.*"

April 5th.—There is less than the usual inflammation, and he makes no complaint. I intend to operate on the other side in a few days, mesmerizing him first, if possible, and have invited many persons to be present.

SECOND EXPERIMENT.

April 6th, 11 *o'clock*, *A. M.*—The inflammation has become high during last night; the part is hot and excessively tender; the lightest touch causes great pain. Skin hot; pulse quick. I could not resist the temptation of satisfying myself still further, and relieving him at the same time. So, turning to the native doctors, I said that I would again try the "Belatee Muntur" (the Europe charm), and began the process as before; he lying in bed. In ten minutes the mesmeric haze (smoke he always calls it) was produced. After half an hour he still complained of the pain in the inflamed part, and could not bear its being touched; in three-quarters of an hour the coma was established, and I squeezed the inflamed part with no more effect than if it had been a bladder. Having business to attend to in Chandernagore, six miles off, I called, in passing, on the Rev. Mr. Fisher, and said that he might now satisfy himself by going to the hospital in my absence; and that, except mesmeric means, he was at liberty to use every possible means to awake him, or make him feel. Here I have the pleasure to introduce a report of the proceedings of Mr. Fisher and Mr. Money while I was at Chandernagore:

"To J. Esdaile, Esq.:

"*My Dear Sir*—I beg to certify that I twice saw the native whom you had put into a mesmeric trance, or state of catalepsy, and from the successful application of different tests I have no hesitation in stating, should my statement add any weight to your own testimony, or be of any service to the cause of the imperfectly known, and hitherto unfairly treated science of Mesmerism, that the individual in question was in that state entirely insensible of pain, and that I believe, if you had cut his leg off, he would not have felt it. I saw, when I was in England, both publickly and in

private, many cases of Mesmerism, accompanied by unnatural and wonderful phenomena, without being convinced. But your case is one so free from all possibility of suspicion, that to have doubted it, one might as well have doubted his own existence.

"Yours truly, D. J. MONEY."

"*Hooghly, 9th of April*, 1845.

"I have only to add to the above, that I was present upon the last occasion referred to by Mr. Money, and fully concur with him in thinking that the patient, during the Mesmeric trance, was totally insensible to pain. Indeed, all the senses appeared to be unnaturally suspended from any manifestation of their ordinary operations, and every available test was tried in vain. Dr. Esdaile upon this occasion was absent at Chandernagore, having previously put the patient into the trance. F. FISHER."

Returned to the Hospital at 3 o'clock, and found him lying just as I had left him. Awoke him in a few minutes, by rapid transverse passes, blowing in his face, and giving water to drink. Is free of pain, and still desires to sleep; says his head turns.

[Translation of a Report from Kurreem Ali Khan, native doctor, of what he saw and heard in the Jail Hospital, on the 6th April, 1845.]

"At 11 o'clock, A. M., the patient, Madhab Kaura, was in a fever, and there was an acute pain in the scrotum. The worthy Dr. Sahib (may he ever prosper) came to the hospital, and began to do something to him. When the experiment was going on, Mahab was asked—

"What do you see?"

"I cannot see clearly; something like smoke is before my eyes."

"Do you see the doors?"

"No, nothing but smoke."

"Do you see Dr. Sahib?"

"No, I see nobody, but perceive some one is talking near me."

"Is there any pain in your body?"

"Yes, breathing causes pain in the belly."

"Is there pain in the scrotum?"

"Yes, as acute as ever."

"How do you feel now?"

"I feel cold and sleepy."

"After the Doctor Sahib had tried for nearly three-quarters of an nour, he fell into a deep sleep, and there seemed to be no pain in the scrotum; he slept so sound, that even the pricking of his body with a pin did not restore his senses, or awake him. Before, a touch of the scrotum was painful, but after he was asleep, even pricking it caused no pain whatever.

"He continued in this state for three hours, when, the Dr. Sahib calling him aloud twice or thrice, he came to his senses and opened his eyes. He asked for water, which he drank, and, feeling cold, covered himself."

[Translation of a Report from Noboo, native doctor, of what he saw and heard in the Jail Hospital, on the 6th April, 1845.]

"On the morning of the 6th of April, I went to the Hospital, and found the body of Madhab Kaura hot and feverish, and he felt a great pain in the scrotum.

"At 11 o'clock, Dr. Esdaile, the civil doctor, came and made some operations on the body: something I do not know. While the operation was going on, the patient was asked if he could see plainly, but said no. When asked if he could see any one, he answered, that he could see no one, but knew by the sounds that some people were there.

"Again he was asked if he felt any pain; he said, that he felt a severe pain in the belly, on breathing, and also in the scrotum, and felt very cold. Soon afterward he became senseless.

"At 2 o'clock, P. M., the Rev. Mr. Fisher and Mr. Money came to the hospital, and tried to bring him to his senses by pricking him with a pin, putting fire on his hand, and beating a gong in his ear, but all proved ineffectual."

I forgot to note down what these reports notice; his complaining of feeling cold soon after the process began; and that when I left him the temperature of his body was natural.

On these two occasions, the effects were witnessed by all the patients and hangers-on in and about both hospitals.

April 7th.—Has had a good night, is a little feverish; pain in the scrotum much less. He now complains, for the first time, of pain in the places where he was pricked and burned.

This makes one ashamed of incredulity, and I will never put a patient to the "question" in this way again. It is only excusable for the first time, when we can hardly believe the evidence of our senses.

THIRD EXPERIMENT.

April 11th.—Took the sub-assistant surgeon with me to-day, to the Jail Hospital, and desired him to watch the time taken to produce the different effects. There is still considerable pain in the side operated upon. Pulse regular, 60; skin warm. At 11 o'clock, A. M., I seated him on the floor with his back against the wall; placed myself before him on a stool, and proceeded pretty much as before. The process in one particular was varied; I leaned my elbows upon my knees, placed my mouth over the back of my joined hands, and breathed along their upper surface; the points of my fingers being pointed steadily at his eyes, nose, and forehead, in succession. This seemed to be very effectual, and was done with the idea of concentrating the mesmeric influence of the whole body into one conductor. It was curious to observe that he had begun to think on the subject, and was observing the effects for himself, and testing his senses as we proceeded. After manipulating for a few minutes, he opened his eyes, looked sharply and minutely about him, and being asked if he saw quite well, he said, "Oh, yes." In a minute or two he repeated his inspection, and answered again, that

he saw quite distinctly; in seven minutes he again looked about him, seemed surprised, and said he only saw "smoke."

In fifteen minutes he was pinched; and when asked if any one was pinching him, he replied that he could not tell, as I might now cut a piece out of his body without his feeling it. I now tried for an abnormal mental manifestation; certainly not expecting to be gratified. I asked, "What will cure your complaint?"

"You know best."

"Has the Baboo any complaint?"

"How should I know?"

I understood this as a hint to attend to the business in hand, the body, and therefore proceeded to induce the mesmeric coma as quickly as possible; and succeeded in twenty minutes from the commencement. I then said to the sub-assistant surgeon that I would operate upon him in this state, if I could find some of the European gentlemen to be witnesses. On going to Chinsurah, two miles off, I fortunately found a considerable party, consisting of the Baron Law de Clapernou, Governor of Chandernagore, Mr. Russell, the judge, Mr. Wauchope, the magistrate, J. St. Pourgain, Esq., Mr. Clint, Principal of Hooghly College, and Mr. Clermont, head master of the Lower School; who all accompanied me back to the hospital. The man had fallen down, and was lying on his back. The large gong of the jail was brought, and struck violently within a few inches of his ear, with no effect. I then pierced the scrotum, and threw in the injection, without any one being sensible of the smallest movement in his face or body. His limbs were quite flexible; but on holding one of his legs in my hand for a few seconds, it gradually became quite rigid, and we could not bend it again; the same occurred in the other leg. The arms were supple, and lay in any position into which they were thrown; and when the fore-arm was bent upon the humerus, and then let go, it fell upward or downward, instantly. But on placing my united fingers over the ends of his, the arm remained fixed at a right angle in the air, and swayed to and fro, according to my movements. The insensibility of the iris was also tested, and proved.

6 o'clock, P. M.—Still sleeps; most complete relaxation of all the limbs now exists. The legs and arms can be tossed about in every direction, and where they fall there they lie. Being curious to ascertain the effect of the artificial state on the natural process of inflammation, I did not awake him, but saw that the part was as flaccid as when the water was just withdrawn.

April 12th.—He awoke at 12 o'clock last night, spontaneously. Recollects nothing after going to sleep; sees the water is gone, knows not how; supposes the Dr. Sahib did it. The testicle is considerably enlarged to-day; there is little pain, and it did not swell till after he awoke. He has had chronic diarrhœa for some time; four and five motions a day, but has had none since yesterday forenoon till this morning. Natural, artificial, and diseased actions have therefore been all equally arrested for the last thirteen hours; a

practical fact of the utmost importance, which will not be lost sight of by myself, or others, I hope. What a blessed prospect this opens to sufferers who may be sensible to the Mesmeric influence! In time we may hope to discover who they are, by detecting the laws which regulate this power of Nature, and thereby save ourselves much trouble and disappointment. In the meantime, let us accumulate *facts*, as the seed for a correct theory hereafter. Although I should never succeed again, I will in future think, speak, and write of Mesmerism, as being as much a reality as the principle of gravitation or the properties of opium. For, under all the circumstances, I cannot but consider these to be unexceptionable *facts;* and if I should not again be able to elicit them, it would not shake my belief in the existance of Mesmerism; I should only conclude that the failure arose from my ignorance of the conditions required by Nature, or from some personal disqualification. The rarity of the occurrence would not make it less a reality; and to deny a fact because it has been seldom witnessed, would be as reasonable as to doubt the existence of comets because they are rare appearances.

Great weight is very justly attached to *first experiments* in any new subject of investigation, for these are often a voluntary and unexpected evolution of the powers of nature; and when the results surprise the experimenter even, we feel confident that he only relates what he actually saw, and that he is not seduced, by previous theory and prepossession of mind, to interpret appearances in support of a foregone conclusion. In making these experiments, I was in the situation of a chemist, who has heard that a new elementary substance had been discovered by a certain process, and who thereupon sets his apparatus to work in the way prescribed, and is rewarded by obtaining the same results as the first discoverer.

Besides the general results, I noted in this case the following particulars as *facts*, which determined the course of my future proceedings.

I was sure there could be no imagination at work in the matter.

That there was no consent between the parties.

No mental sympathy.

That the patient's eyes need not be open.

I therefore came to the conclusion, that in this instance, the influence must have been of a purely physical description, and on this supposition I conducted my subsequent experiments; with what success will be shortly seen.

CHAPTER III.

Mesmerism the same in India and in Europe.—Examples of Mesmeric Sleep.—Sealing of the Eyes.—Altered Sensibility.—Temporary paralysis.—Muscular Rigidity.—Insensibility to Pain.—Exaltation of particular Organs.—Convulsions.—Delirium. Injustice done to the Memory of the first Mesmerists.—Every available Evidence here given.—Imposture morally and physically impossible.—Mode of Proceeding.—Mesmeric and Non-Mesmeric Operations contrasted.—Physiological Demonstration of the impossibility of Imposture.

HAVING, by the experiments described in the last chapter, satisfied myself of the existence of the Mesmeric power, I lost no time in applying it to practical purposes. The effects produced were nearly as various as the different persons acted upon, and corresponded perfectly with the appearances observed in Europe; and when the public see the same effects following like causes on the banks of the Thames, and the Siene, the Rhine, and the Hooghly; I presume it will conclude, that the same agent is at work, provided the same evidence, in support of matters of fact, is received for hot and cold climates, and it is not supposed that the truth is affected by degrees of latitude. In a late number of the "British and Foreign Medical Review," the reviewer gives a summary of the Mesmeric symptoms as known to himself, and recorded by various writers on Mesmerism, and acknowledges a perfect accord in all the accounts of the bodily phenomena. The following extract will place these appearances succinctly before my readers, and I beg them to compare my account of Mesmerism in Bengal with this statement of its effects in Europe, and then say whether the identity of the thing in the East and West is not established:

"Sometimes, however, there is said to supervene a state of coma; at others, exaltation, depression, or some anomalous modification of sensibility; and occasionally, a state somewhat approaching to that of reverie, wherein the individual, although conscious, feels incapable of independent exertion, and spell-bound, as it were, to a particular train of thought or feeling. The occurrence of convulsive action, and of muscular rigidity, is described as taking place in some cases to a greater or less extent. These results are said to constitute the *simpler phenomena* of Mesmerism. We shall illustrate them by some extracts from accredited writers upon the subject.

"In this peculiar state of sleep, the surface of the body is sometimes acutely sensible, but more frequently the sense of feeling is absolutely annihilated. The jaws are firmly locked, and resist every effort to wrench them open: the joints are often rigid, and the limbs inflexible; and not only is the sense of feeling, but the senses of smell, hearing, and sight also, are so deadened to all external impressions, that no pungent odor, loud report, or glare of light, can excite them in the slightest degree. The body may be pricked, pinched, lacerated, or burnt; fumes of concentrated liquid ammonia may be passed up the nostrils; the loudest reports suddenly made close upon the ear; dazzling and intense light may be thrown upon the pupil of the eye; yet so profound is the physical state of leth-

argy, that the sleeper will remain undisturbed and insensible to tortures, which in the waking state would be intolerable."—(*Dupotet*, p. 36.)

The above concise sketch corresponds very closely with what is laid down in other works of Mesmeric repute. A few brief quotations, exhibiting this correspondence, we subjoin. The first we take from Deleuze's Practical Instructions, wherein he states that "the magnetized feels the necessity of closing the eyes; his eyes are so sealed that he cannot open them: he experiences a calm, a feeling of comfort; he becomes drowsy; he is put to sleep." Teste, another writer of distinction, speaking of the physical insensibility, says, "it exists, not only in the skin, but in the subcutaneous tissues, in the muscles, and even in the nervous ramifications." Dr Passavant of Frankfort, an author often referred to, avers as follows: "As an especial effect of the power of animal magnetism, results the magnetic sleep. This is mostly deeper than ordinary sleep, the mediation of the senses is yet more decidedly suspended. The sensibility can so have vanished in a moment, that the loudest sound, the brightest light, even bodily injuries are not perceived in this sleep." Indeed, all the authorities seem to coincide very much in their accounts, and this we say, after referring to Chenevix, Elliotson, Townshend, Gauthier, Foissac and others.

I shall now present to the reader illustrations of all the singular states of the system described above, and drawn from my practice here.

MESMERIC SLEEP.

This simulates, perfectly, sound natural sleep, and is more refreshing, even if it has been resorted to for soothing pain, or disturbance of the system, and can be had recourse to when it would be improper or useless to administer common narcotics; over which it has the advantage of not inducing a disagreeable constitutional derangement, after the specific influence has ceased. The restorative powers of mesmeric sleep seem to depend upon an actual infusion of nervous vigor into the body, and, when induced as a remedial agent, this may account for its superiority over common sleep.

April 7th.—Janokee-Sing, a hardy looking peon; the whole of the scrotum is sloughing, from the application of some acrid leaves, and the pain is most intense.

April 15th.—The whole scrotum has sloughed off; has not slept since coming to the hospital. The compounder, a healthy, intelligent Hindoo, succeeded in putting him to sleep to-day, in half an hour. He awoke when pinched, or called upon by name, but instantly fell asleep again.

April 16th.—Has slept almost without interruption, from 11 o'clock, A. M., yesterday, till 7 o'clock this morning, the only sleep he has had since he was burned.

April 19th.—He has been mesmerized daily, and sleeps the greater part of his time; to mesmerize him, becomes more easy every day; and a few minutes now suffice to overcome him.

April 20th.—Kowsoalla; aged forty, a peasant woman. I subdued her to-day, for the first time, in ten minutes: she awoke when called upon, but, in a second, fell asleep again. The limbs are quite loose, but when I let them remain for a moment in any new position, they become rigid, and require to be dragged into a new attitude: the muscles yield precisely like lead, without a vestige of re-action, when the bending force is removed.

April 25th.—She can now be mesmerized in a minute.

May 3d.—Bissumber Chowdry; has had retention of urine for three days; the bladder is prominent at the navel, and no instrument can be introduced. Ordered to lie in the easest posture, and to be put to sleep, if possible.

May 4th.—He slept for two hours yesterday, and voided his urine freely, when he awoke.

May 4th.—Deenoo, a prisoner; convalescent from cholera, is tormented with incessant hiccough for the last twenty-four hours.

Opii Grs. ii.
Confect. Arom. Grs. x.

If this does not check it, a blister to be applied over the diaphragm.

May 5th.—No better; to be mesmerized. I returned after three hours, and found him asleep—awoke him: has no hiccough.

May 11th.—No return of the hiccough.

SEALING OF THE EYES.

The quivering of the eyelids, and their subsequent spasmodic closure, is one of the most specific mesmeric symptoms.

June 27th.—The woman Alunga complains of considerable pain from the extension of her arm yesterday, and the nerve at the elbow is very tender. I passed my fingers along the course of the nerve for a few minutes, which removed the pain; I then held my fingers before her eyes, and in a few seconds she fell into my arms quite insensible. I soon after awoke her, and she sat up conversing with us as usual, but could not possibly open her eyes; when ordered to do so, she was obliged to pull the eyelids asunder with her fingers; but they would not remain open, and the difficulty was only removed by my rubbing and blowing in her eyes. I have shown this peculiarity, in numerous cases, to great numbers of persons

ALTERED SENSIBILITY.

Rajah ———, an intelligent Hindoo gentleman, who has received an English education, and speaks our language perfectly well, wished to be operated on for hydrocele, while in the mesmeric trance. After half an hour's manipulating, I extended his arm, and it took a fix in any position I put it: it was put perpendicular in the air, and remained motionless for ten minutes; on depressing it again, it bent like lead, in the true cataleptic fashion. Having replaced his arm at his side, I began to open his dress, when he awoke with a violent start, and instantly said that he had no feeling in his arm; that it was very cold, which we all felt, and on put-

ting a thermometer into his hand, we found it to be two degrees colder than the other. He remembered my raising his arm, and felt me let go my hold of his thumb, but what became of his arm after that, he could not tell—he imagined it was lost. Having lately felt the sensation of galvanism, he said, that he felt slight shocks in his skin during the process, exactly like what he had experienced from galvanism. I have observed this in other patients.

TEMPORARY PARALYSIS OF MUSCLES.

Madub, a shop-keeper. This man was operated on for hydrocele, when in the trance, without feeling it, and ever since has been very easily affected; I have, therefore, made him the subject of several experiments. In a minute or two, his eyelids begin to quiver, then slowly close, opening heavily at short intervals, till at last they remain closed altogether. If at this stage he is ordered to open his eyes, the effort to do so only strains the eyelids, which appear to be glued together, and he says it is impossible to separate them. Being desired to help himself with his fingers, he rubs his eyes violently, and then forcibly separates the eyelids, when nothing but the white of the eye is seen; the cornea being turned up to the roof of the orbit. While rubbing his eyes, I sometimes seize his hands and extend his arms horizontally on either side; the arms become fixed in a moment, and when desired to apply his hands to his eyes now, he says that he cannot, that he does not know where his arms are. If I blow on one arm, or impel a current of air against it by fanning, the rigidity disappears, and he uses his arm as desired, but the other continues catalepsed and useless, till relieved in the same way. When I urge him to use both arms, he says he has only one, and on being desired to seek for the other, he passes the flexible arm across his body, and gropes at the other side for it, but soon gives up the search, saying, it is not there: being desired to look for it higher up, he carries his hand up the opposite side till he reaches the catalepsed arm, and tries in vain to depress it; the arm remains horizontally extended, and resists all his efforts.

MUSCULAR RIGIDITY.

Is usually attendant on mesmeric coma, of which numerous instances will be given, when treating of the medical part of the subject. My first patient, by repeated experiments, became excessively sensitive, and affords a good specimen of mesmeric catalepsy.

May 13*th*.—Madub Kaura; this man can be catalepsed in less than a minute; and the effects are passing strange. If, when he is standing, I point my fingers at him for a few seconds, his eyelids immediately droop, his arms fall by their mere weight to his sides; his whole body begins to tremble, owing to the incipient loss of command over the muscular system; and, if not supported, he would fall down in a heap. But give him a moment's support, and he becomes as rigid as a statue; and, if the center of gravity is well

poised, he will remain in any posture he is put into, and that for a longer time than I have waited to see. The muscles must be dragged out of the fixed position they have assumed, and allowed a moment to contract in a new attitude, out of the perpendicular; for, if suddenly pushed, he goes down, head foremost, like a statue from its pedestal, and his life is endangered. However inconvenient or grotesque the position may be, he is equally well satisfied, and continues to sleep quite comfortably, with his heels behind his neck; and if his forehead is placed against the wall at an acute angle, he remains sticking out from it, like a buttress, longer than I have ascertained.

INSENSIBILITY TO PAIN.

This will be copiously illustrated in my numerous surgical operations.

SOMNAMBULISM,

Will have a chapter to itself, and need not now be introduced.

EXALTATION OF PARTICULAR ORGANS—CONVULSIONS—DELIRIUM.

Instances of all these will occur in the course of this work, and be found to correspond with the irregularities observed in Europe; so that the general rule, and its exceptions, will be recognized to be the same in the eastern and the western hemispheres; thereby proving the universality of the truths declared by many honest and independent men, during the last sixty years, and for propounding which they were laughed at and scorned.

Apart from the personal gratification of being admitted to see the secret processes of nature's workshop, and the advantages of being able to imitate her processes for the alleviation and removal of human suffering, it will be a great satisfaction to me, if my evidence and labors should assist in raising the dishonored dead into the public consideration and respect due to them as benefactors of mankind, and in exciting a regret that wisdom called so long in the streets without any one regarding her.

I now know (and I deplore my long ignorance) that the battle was fought, and won, before I was born, by the truthful and benevolent Puysegur, Deleuze, and their companions, and that I, under the tropics, am only again demonstrating what they, on the banks of the Seine, had long ago established. The people of the continent have been familiar with both the good and the evil of Mesmerism for the last thirty years, while we in England are only now giving an unwilling ear to the expounders of a law of nature, which is as much a part of the human constitution as the processes of thought and digestion. It is to be hoped that, on this subject, our neighbors will no longer have reason to reproach our insular ignorance and presumption, and that if Mesmerism is rejected by the English public, it will be after study and experiment, and not from prejudice and passion.

Knowing the new and wonderful nature of the subject, and that

the public was ill prepared to receive the naked truth on individual testimony, I have called in all the available evidence on the spot; and the facts related by me will be found to be vouched for by disinterested, honorable, and intelligent gentlemen, both residents and strangers; and if there is not a cloud of European witnesses, it is simply because no more exist in this neighborhood. I would have preferred the plain of Calcutta for my theater, and all the inhabitants for spectators, if it had been possible. All I have done, or may hereafter do, has been done, and shall be done, in open day, and every case related has had from half a dozen to hundreds of witnesses. The patients are on the spot, or can easily be found, and a host of eye-witnesses are ready for any one who may take the trouble to investigate the matter on the spot.

Taking these general circumstances into account, I might leave the cases to be adduced to speak for themselves, but I hope to be excused for pointing out some particulars which will, I trust, demonstrate that imposture, in the generality of my cases, is morally and physically impossible.

It is *morally* impossible that I could have taught my patients what I did not know: for I knew not the existence of the diversified symptoms they exhibited, till, day by day, I became a witness of their unexpected occurrence. I had never read a Mesmeric book, when I made my first experiment; and having succeeded in getting nature to speak, I determined to listen only to her for some time, and for months purposely refrained from reading on the subject, in order that my senses might not be predisposed to see things in any particular light, and that my judgment might be left unbiased by the opinions of others. My reason did not teach me to expect what was presented to my senses; but was gradually instructed by what I saw and did: and all that I know about Mesmerism has been acquired by reading the book of nature, without guide or interpreter. If I was ignorant of the subject, the peasants and coolies of Bengal must have been equally so, I presume. No rumor had gone abroad regarding the existence of such a power; Mesmerism had not become the village talk in Bengal, so as to enable some clever rogue to exhibit the phenomena of which he had heard: there was no type to imitate, therefore imitation, in the first instance, was impossible. Be it observed also, that the cases did not happen among people in hospitals at the same time, but arose, day by day, among patients newly arrived from different parts of the country. The routine followed is this. A person presents himself before me for the first time, and I see he has a disease requiring an operation for its removal: he is desired to go into another room (which is dark) and repose himself after his journey, not a word being said about an operation, as this would cause a mental excitement, destructive to the mesmeric influence. One of my assistants follows him; seats himself (if unperceived, so much the better) at the head of the bed; and by using the process to be hereafter described, often reduces the patient to a state of coma by the end of

my visit: I then do what is necessary, whether it be to take off, or straighten a limb, without his knowledge or consent. Now, supposing these poor, ignorant people to be impostors, whence comes their intimate knowledge of the mesmeric phenomena, from the quivering of an eyelid onward to insensibility to the most cruel tortures. If they are not what they seem to be, then are they heaven-born impostors, or have had super-natural instruction—on earth they could not have learned it.

It may be said, that it is the taste of the coolies of Bengal to have themselves cut to pieces, and to have corrosive acids, and red-hot pokers, applied to their sores, without showing a sign of life; or that, knowing my hobby, they come from all quarters to be silently tormented, in order to please my Honor. Or we may be told, that the passive endurance of pain is no sign of the absence of it, for the North American invites his enemy to tear him at the stake, and the Indian fuqueer voluntarily torments himself.

To do justice to this ingenious hypothesis, I shall present the reader with some examples of the way in which pain is borne by my patients, in the mesmeric and non-mesmeric condition of the body.

June 12*th*.—Lokee, a peasant woman, aged sixty, has a tumor on the calf of the leg of nine years' standing: it is full of deep ulcerations and maggots. I tried to subdue her yesterday, but the pain did not allow her to get beyond common sleep. To-day, after much trouble, first by one person, and then another, she was entranced, and I cut out the tumor in the presence of Captain Elder, without her feeling it, and we left her sleeping.

June 13*th*.—She awoke three hours after the operation; felt no pain on waking, and asked me to-day, who cut off the tumor?

Oct. 24*th*.—The woman Lokee has come back to the hospital, with a return of the tumor, cut out in June last, to be mesmerized.

Oct. 27*th*.—She has been mesmerized daily, for two hours, but without effect. I therefore operated on her to-day, as we could spare no more time for her, others requiring equal attention. The poor old woman screamed miserably the whole time, crying, that I was murdering her; and she continued in the greatest pain for hours afterward.

If the old woman shammed insensibility on the first occasion, why did she not do so on the second? She had had practice; every facility and encouragement were given her, and she knew what was wanted of her, and yet would not pretend to be asleep!

This perverse and inconsistent conduct appears to me to be easily accounted for, from the very fact of her being aware of what was wanted and intended to be done: her anxiety to go to sleep neutralized her good intentions—excitement of mind being destructive of the mesmeric influence for the production of coma.

August 13*th*.—Dr. Finch freely applied muriatic acid (such as is furnished by the Company's dispensary) to a sore, covering all the right temple of the woman Gendo (who was mesmerized, in his

presence, by one of my assistants) without her showing the smallest degree of consciousness; and it was with great difficulty that I awoke her, after he had failed to do so. During the burning with the acid, her pulse fell from 88° to 80°, and her respiration, which was quite natural before she was mesmerized, became entirely diaphragmatic and abdominal; the voluntary and semi-voluntary muscles of the chest being completely paralyzed.

August 18th.—Dr. Bedford to-day asked permission to apply the acid to the woman Gendo's sore, when she was awake; and though I thought this most irrational skepticism (he having witnessed Dr. Finch's experiment) I consented, in order that it might not be said that I interfered to save my phenomena.

(To be Continued.)

ART. III.—ANIMAL MAGNETISM.—(Continued from page 174.)

Another important error of Deleuze, is that Magnetism generally exerts no influence upon persons in health. The man, he remarks, "who was insensible to it in a state of good health, will experience the effects of it when ill." "There are many diseases in which the action of magnetism is not perceived; there are others in which it is evident. We do not yet know enough of it, to determine the cause of these anomalies, nor to pronounce beforehand whether magnetism will, or will not, act. We have only certain probabilities in regard to it; but that should not create an objection to the reality of magnetism, since at least three-fourths of the patients feel the effects of it."

The general tendency of the writings of Deleuze, is to discourage scientific investigation, and to hold forth the idea that animal magnetism should be nothing more than a benevolent ministration to the sick—should be used upon them alone, and then only in the most reverential manner.

The proposition, that magnetism generally exerts no influence upon persons in health is not correct. There are many persons who, in high health, possess extreme susceptibility to the nervauric influences of others, and who manifest the highest phenomena that have ever been observed in mesmeric patients.

It is far from being true, that impressibility implies disease (any more than that genius implies insanity) and arises only in morbid conditions. On the contrary, I have found a high degree of impressibility in persons whose health had been truly extraordinary, never having been confined, or seriously affected by sickness during the whole course of their lives. So far from considering disease

necessary to impressibility, I have little doubt that, when the human race shall more generally obey the laws of health and be more uniformly surrounded by intellectual and moral influences, a high degree of impressibility will become almost universal.

It is true, that disease generally exalts our impressibility, but not uniformly. There are diseases in which our sensibilities become obtuse, and we are less affected by the influences of the nervaura. There are others, especially those of an acute character, in which our sensibilities are greatly increased—in which the nervous influences, or the smallest doses of medicine, produce powerful effects. This was of course a mystery to Deleuze. But I apprehend there is no difficulty in showing why certain diseases increase, and others diminish, our susceptibility, according to their location, when we understand properly the nervous system.

In reference to the influence of operations upon the magnetizer himself, Deleuze writes thus (p. 25): "Many persons feel much fatigue when they magnetize; others do not feel any. This is not owing to the movements that are made, but to the loss of the vital principle or magnetic fluid. He who is not endowed with great magnetic force, would exhaust himself in the course of time, if he were to magnetize every day for several hours. Generally speaking, every one in good health, and not enfeebled by age, might undertake the treatment of a single patient, and give him a sitting of one hour each day; but every one has not the strength necessary for magnetizing several persons, nor several hours in succession."

The nature and degree of the fatigue produced, depend upon the conditions of the operator and of his patient. If the former be highly impressible, he will be powerfully affected by the condition of his patient. If his impressibility be slight, he may produce important effects without experiencing any re-action upon himself. It is, therefore, desirable, that the operator, for the relief of disease, should be hardy and unimpressible, and that his subjects should possess the highest degree of impressibility. But even if these conditions exist at the commencement of his experiments, the operator will find that, in the course of a few months or years, he imbibes from his patients a considerable portion of their impressibility, and becomes continually more impressible himself. He thus tends continually to lose his resisting power and feel the symptoms of the diseases with which he is brought into contact.

The amount of injury which he receives is proportionate to the nature of the disease with which he is brought into contact, and to his own natural capacity for that form of disease. If, for example, a gentleman strongly predisposed to tubercular consumption should undertake by nervauric manipulations to relieve a person suffering under that disease, it is probable, if he persevere at all, that he will receive serious and permanent injury. But if another, with no predisposition in that direction, and with a high endowment of health and hardihood, should undertake to impart relief to the same patient, he might accomplish much good without being sensible of any impor-

tant injury to himself. As a general rule, however, I am compelled to admit the natural tendency of disease to be propagated from the patient to the operator. Unless the latter is extremely guarded in his movements, and careful to maintain the vigor of his constitution, he must, in the course of time, realize the injurious effects of his manipulations.

I have no wish to discourage these benevolent operations for the relief of the sick; but I would urge on those who are disposed to engage in them, that it will be necessary to maintain the vigor and hardihood of their constitutions, and to be in a highly vigorous and hardy condition at the time of the operation—to secure a free circulation of air, so as to avoid inhaling the breath of the patient—to protract their operations no longer than is necessary—to continue in an active, energetic state throughout the interview—and, at its close, if the hand has been much in contact with the patient, to manipulate the hands themselves in a downward direction, as if to brush out the morbid influences—to conclude by washing them, and immediately afterward take exercise in the open air. It will be still more beneficial to substitute a healthy influence for the morbid impression, by coming in contact with some one of healthy constitution, and placing the hands five, ten, or twenty minutes upon the back part of the shoulders, or touching the organs of Health and Vitality upon the head. If these precautions be neglected, there is a strong probability that the operator will, in time, realize an injurious influence on his own health, which will perhaps cause him to abandon entirely the treatment of patients. But if these are duly observed, he may long continue, with impunity, a benefactor to the sick.

An important suggestion is contained in Deleuze's Tenth Proposition: "The magnetic fluid may not only act directly upon the person whom we wish to magnetize, but it may also be transmitted to him by an intermediate body which we have charged with this fluid, to which we have given a determinate direction." This passage presents one of the most delicate phenomena of animal magnetism, in regard to which we are continually liable to confound actual perceptions and physiological influences with the effects of imagination. The pretensions of magnetizers in this direction, have given rise to no little ridicule and incredulity.

When the Marquis de Puysegur (one of Mesmer's first and most famous followers or imitators) arranged his patients beneath a tree, and supposed that, by certain mysterious movements of his hand upon the tree, magical virtues would be communicated to it, which might be transmitted at once to all the expectant invalids around put into communication with its branches, it is not at all strange that the public should laugh at his performances. Even if the reality of the supposed magnetic fluid and its transmission through the tree, had been established by any definite scientific experiment, common sense would have suggested that the power of imagination was adequate to producing the effects at which the magnetizer

aimed. Between the well known powers of imagination and the hypothetical powers of the supposed magnetic fluid, the public mind could not hesitate a moment as to which was the real agent.

The established fact, that imagination may effect the most wonderful cures, and even transform the mental character of the patient, seems to have been overlooked by the early magnetizers; they could see nothing in all their experiments but the potency of the wonderful and mysterious "fluid." On the other hand, the anti-mesmeric party, knowing the powers of the imagination, were blind to the existence of any other agent. All the evidences of nervous influence, exercised by one constitution upon another, were dogmatically rejected, because similar influences were sometimes known to be produced by imagination. It is probable that, in this matter, both the mesmerizers and their opponents were wrong in the ultra and exclusive doctrine which each party maintained—but with the lapse of time, we now see, that each party has progressed nearer the truth. The opponents of animal magnetism have yielded by thousands to the conviction, that there are forces of some kind emitted by the human constitution which had not been recognized "in their philosophy;" and, on the other hand, many mesmerizers (in the United States, at least) have learned that many of their most interesting results are really the product of imagination, and now operate principally by means of that power.

The most successful mesmeric exhibitors in our country at the present time, instead of going through the magical passes, which were formerly universally practiced and believed to be indispensable conditions of the charm, now rely mainly upon the assertions and commands, which they address to their patients or subjects in an imperious voice. These submissive patients are told that they "must go to sleep," or that they "will be asleep" in a certain time. The assertion alone produces the effect. They are told, for example, that a handkerchief held before them is a snake: they believe it, and manifest the natural alarm and horror of the object. This class of experiments is highly amusing and gratifying to the public, although it proves nothing more than the well known powers of imagination. It conveys no new scientific or philosophic instruction, and virtually tends, by demonstrating the extraordinary powers of the imagination, to conceal from our view the most important phrenological laws and actual nervous influences of man.

The assertion that this "magnetic fluid" may be imparted to particular substances, and may, when thus mediately imparted, exert important influences upon the recipients, is susceptible of experimental demonstration. Yet, as these influences are of a very subtile character, and require acute perception for their recognition, we should investigate with caution, lest we confound the real influences of this class with the equally powerful influences of the imagination. A variety of experiments, which may be performed by the highly impressible, show that various inorganic substances may receive from our constitution its nervous influences, to be imparted

again to others; but for the present it is sufficient to refer to our experiments upon letters, in which it has been shown that the entire physiological and mental constitution of the writer imparts its influence to the writing which he executes. This being a well established and unquestionable fact, we can well imagine that other substances than paper and ink may receive similar influences.

I feel authorized by my experiments, to announce the general law upon this subject: That every organ which we possess has an analogy or affinity with certain substances in nature, which substances are the best calculated to receive and transmit its peculiar influence. All our emotions, passions and faculties, have thus their analogues in the material world; and the affinities to which I have alluded, are the foundation of our peculiar regard for different substances. The precious stones, the various metals, and all the substances of which tokens, amulets and emblems have been formed, sustain scientific relations to our organs, which explain the different degrees of estimation in which they have been held. The value of the diamond, pearl, ruby, gold, silver, and the baser metals, and even that of flowers and other emblematic objects, is based upon immutable relations which these substances severally sustain to the organs of the human brain.

These relations are based upon ultimate laws of affinity, not yet understood. Science has never yet explained why opium affects the brain, why tartar emetic produces nausea and emesis, or why calomel excites the liver and bowels. It is merely known that certain substances bear a direct relation to particular organs and functions of the human constitution, and whenever introduced in the body, or even brought in contact with it, are capable of exciting them. No steps have yet been taken to solve this mystery. Why certain arrangements of forms and colors affect us with a sense of beauty—why certain sounds give us a ravishing delight—why medicines act on particular functions and passions—why arsenic and copper are deposited in the liver, no physiologist understands. We merely know that such affinities exist.

That these affinities qualify the substances better to receive a charge of the appropriate nervaura, is a proposition of great practical utility. Homœopathy, which is one of the most important steps ever taken in the science of medicine, is an illustration of this affinity between the nervaura and medicinal substances. The infinitesimal preparations of Homœopathists have a much greater power than we can explain by the ordinary laws of physics. We are compelled to believe that, in the art of trituration, the nervauric force of the operator becomes attached to the medicine, as much as in the act of writing it is imparted to the manuscript. Thus it acquires a power of reaching the nervous system more effectually, and carrying with it the energy and heat imparted from the constitution of the operator. Homœopathic practice may, therefore, be regarded as a continuation of the influences of medicine with those of the nervaura or animal magnetism.

ART. IV.—IMPRESSIBILITY.

THE widest field for the explorations of science, is that which has been developed in the nervous system of man. From entering this field our savans have heretofore been deterred by the pusilanimous fear of encountering truths too grand and incredible to be recognized by the people of the present time. This fear of the marvelous—this fear of ridicule—this fear of the scorn and contumely which have always accompanied innovation, has paralyzed all bold investigation.

Those of our scientific men who have not been paralyzed by such fears, have been no less effectually restrained by their own rigid and contracted modes of thought. Their stiff and tedious progress from fact to fact, and from one insignificant detail to another no less insignificant and irrelevant, resembles so strongly the tedious gait of a stiff-jointed, rheumatic cripple, that we are compelled to regard many of the strong minds of the present generation as victims of an almost incurable *mental anchylosis.*

Let us go forth in the new era which is now coming, in a different spirit, regarding the ridicule and opposition of one generation as the precursor of the gratitude of the next; looking forth at the grand marvels of nature, which are slowly developing in the freshness of their primitive beauty before the eyes of the present explorers, as the highest and most appropriate reward for the toils of original research and the hazards of laborious discovery.

The wonders of the nervous system have been kept from the observation of mankind, as a department of science, by the blighting and contracting influence of the selfish passions upon the intellectual powers, in all classes of society to the present time. Alike, among the distinguished and the obscure, the intellect is degraded from its God-like function of revealing to man all the mysteries of creation, and employed mainly in the service of the selfish passions. The petty cares and temporary expediencies of civilized life—the entire round of business, vanity and ambition—employs the intellect, it is true, in laborious tasks, but deprives it of all elevating and far-reaching powers. Our shrewdest men of business, our politicians and statesmen, are but men of expediency, whose schemes never extend beyond a few years, or the term of a single generation. This prevailing condition of the human intellect—which affects not only political, mercantile and social life, but science, philosophy and art—renders all rapid progress and all grand discoveries positively repugnant to the public mind, or at least removes them beyond the sphere of popular interest and sympathy. It is for this reason that we find, at the present day, so many learned men laboring upon the dry husks of science, and in the most barren and laborious fields of research, while the limitless

range of neurological science stretches around us in every direction, with its unattainable boundaries and its tropical magnificence of scenery.

The impressibility of the nervous system is the avenue through which we enter this new field of knowledge. The vast and hitherto neglected capacities of the nervous system of man and animals to be affected by all the surrounding media of nature, enable us, by its relations and re-actions, to learn both the internal world of nervous life, and the external world to which its conditions relate. It is nervous impressibility that binds man to the universe, and establishes active relations between every element of his constitution and every element of the surrounding world. We have but to put into play these re-actions between man and the elements, to learn most thoroughly both the outer and the inner world.

In other words, there is nothing in the universe which may not affect man, and which may not be made the subject of an interesting series of experiments, as to the relation which it bears to his organs, and the manner in which it changes his vital and mental functions. Nor are there any powers in the constitution of man which may not be wrought upon and roused by the proper external means, their location in his brain and body ascertained, their cause, their effect, and their entire philosophy made known. On the other hand, there is, probably, *nothing in the visible universe which man may not perceive and appreciate by means of the influence which it may exert upon himself, and by means of the vast perceptive power which modern science has revealed.*

The fact, that nervous impressibility thus becomes the great avenue to all philosophy, leading us alike to the knowledge of the microcosm within and the macrocosm without, requires an investigation of the nature and causes, the seat and extent, of this impressibility.

Impressibility, or the power of being affected by surrounding influences, is a condition which generally corresponds to the rank of the being in the scale of development. In the lowest forms of existence (inorganic matter, as a stone or metal) impressibility is entirely mechanical, or chemical. It may be broken by a hammer, corroded by acids, or disintegrated by fire; but it receives no impression from those changing influences which actuate the animal and vegetable kingdoms. The sunshine of summer brings forth no flowers. The sounds of the human voice excite no emotion. In the vegetable kingdom, a more advanced organization becomes impressible to the influences of the seasons: dormant in the winter, it springs forth to life and beauty in the spring, and responds thus to the delicate changes of the atmosphere and sunshine. Yet, impressible as it is to the influences of the seasons, it feels no influence from mind, from sound, or from objects of vision.

In the animal kingdom, a higher form of development reveals a higher form of impressibility—not only to the changes of the seasons, but to sounds, voices, motions, and the various motives which are presented to volition. As we ascend through the scale of ani-

mal development, we find a greater number and variety of impressions. Worms and insects are unimpressible by the mental influences of man; but the dog responds to the emotions which he perceives in the countenance and tones of the voice. Man, rising far above the brutes in this respect, becomes impressed, not only by the looks and acts of those who are before him, but by the trains of ideas which are conveyed in language, and receives upon his mind the impress of thought or knowledge from the remotest or most ancient nations.

When the traveler rides forth to survey a landscape, the horse is impressed only by the richness of the pasture for his food, while the rider is impressed by a thousand forms of beauty, by the powers and capabilities which he recognizes as lying dormant around him, and by the sublime truths which God is ever pouring into the minds of those who are open to receive.

In comparing different individuals of society, we find a marked difference as to the impressions which they are competent to receive. A man of feeble and uncultivated intellect will pass through a great city in the pursuit of his business, without receiving a single impression which it would be interesting to repeat. A man of genius, pursuing the same route, receives every moment an incalculable number of impressions. His Benevolence is moved by the sight of the needy beings whom he passes. His Pride is roused by the consciousness of the position which he occupies in the midst of the vast drama of life. His Mirthfulness is affected by the ludicrous associations which occur to his ready wit. His Conscientiousness is roused by the sense of social inequalities and injustice. Every countenance that he meets originates an interesting train of thought; every passing vehicle starts some train of associations.

Thus, in proportion to the development of our faculties, do we enlarge our susceptibilities and become impressible by a greater variety of causes. In truth, every cerebral organ furnishes an additional mode of impression; and the highest condition of genius, is that which places a man in active relations to the greatest number of surrounding objects by which he may be impressed. The mind of the man of genius is a daguerreotype plate, the perfection of which is proportioned to the delicacy and promptness with which it receives impressions. Diminish impressibility, and genius sinks to idiocy—man to the brute—the brute to vegetative life—vegetation to lifeless matter.

The impressibility of man is manifested in three forms—the mental, the physical, and the sympathetic. In reference to each of these three forms, neurology contributes a large additional amount of knowledge.

In reference to sympathetic impressibility, nearly all that we know is of recent discovery. Mental impressibility, or the power of being affected by various motives, is a well known but not a thoroughly understood fact.

Every animal is impressed through its external senses by sur-

rounding objects, and influenced thereby in every act and movement it makes. The amount of the impressions received, and the character of the actions to which they give rise, depend upon nervous development. Myriads of objects continually address our senses and impress their appropriate organs, rousing a re-action in proportion to the organic development. The landscape before us, impressing our external senses, may excite Ideality, Sublimity, and the Amiable Sentiments, producing a happy and tranquil state of feeling; or it may stimulate Acquisitiveness by the prospect of fertile fields and animals, and thereby arouse us to industrious exertion. It may excite Vanity and Ambition by the prospect of monopolizing its possession and exerting a lordly authority. It may excite our Fear if it present wild beasts or prowling enemies; or our Benevolence if it is covered with the indication of human prosperity and contentment. In proportion to our organic development for each of these passions, will be the intensity of the impression and the vigor of the action which results.

Phrenology reveals the modus operandi of this impressibility, showing us why particular situations affect the individual, and why they produce different results on different individuals. By a proper cultivation of true phrenological science, the influence of external objects upon man, and the resulting action, may be made a matter of calculation and certainty. The statesman may learn what laws, what institutions, what governmental arrangements will improve society, and what amount of crime, pauperism or riches, may be anticipated from those influences which government controls. The increase or decrease of crime, if we would acquire a knowledge of all the influences which operate upon any population, might be calculated as definitely as the course of the seasons, or the movements of the tides. The human mind is governed by certain laws which are universal in their operation. It has certain definite relations to the influences which surround it. And as the modus operandi of mental impressibility has been satisfactorily explained by phrenology, we need only to accumulate a sufficient knowledge of the circumstances which surround any population, to anticipate and predict their career in crime or virtue, in misery or happiness. The science of government and the science of education are both alike but the knowledge of the impressibility of mind by the influences with which we may surround the subjects of our care.

Since a profound phrenological system necessarily evolves the science of education and the science of government, it is not surprising that such a system gives us new and important views of the whole process of education, leading to a radical revolution in its theory and practice. In addition to the new views of education, modern mesmeric investigations have shown some extraordinary effects in reference to the power of mental impressions made upon a susceptible person. It has been shown that, in order to increase the amount of effect to be produced, it is necessary, not so

much to increase the force of the motive or impressing power, as to increase the susceptibility of the individual to be impressed. It has been shown, that the most wonderful results may be produced by placing the mind in a condition of the highest susceptibility.

The patient who is reduced to the somnolent state by the mesmeric process, is placed in the highest state of mental impressibility which he can attain. In this condition, many are capable of being controlled by the silent will of the operator; and the important fact has been ascertained by thousands of experiments, that if, in this condition, a sufficiently strong mental impression be produced, that impression will be carried out by the individual as though it had become a part of his own being, or originated in his own spontaneous volitions. The mesmeric subject, who is emphatically charged by his operator to go to a certain place, or to do a certain act at a particular hour of the following day, or for several days subsequently, may apparently have forgotten the command when he awakes, yet the impressing power is so strong that, at the appointed time, he feels compelled to do the act—not as if he were driven by an external force, but as if impelled by a spontaneous desire of his own mind. The subject is still more simplified by the class of experiments, in which we observe that the individuals who have not been placed under any special mesmeric influences, and who have merely become somnolent by listening to a public speaker, or by gazing at a fixed object, are frequently in this condition entirely controlled by a word of command. Public lecturers who distribute coins among their audience, to be gazed at until somnolence occurs, have no difficulty in finding among their audience, passive subjects for the exercise of mental impressibility, who will readily obey any command addressed to them in an imperative voice.

In the ordinary intercourse of life, it is only those of extraordinary force of character, whose commands carry with them sufficient force to insure obedience; but, by availing themselves of this principle, any man may acquire the control of his fellow beings by placing them in a state of passive and helpless impressibility. It is true there are many in whom the original force of character preponderates so greatly over the submissive and somnolent tendencies, as to render it difficult to exercise such an influence upon them; but, as all human beings possess those faculties by which we assume the somnolent and passively impressible state, there would seem to be no reason why we should not be able, by the assiduous and persevering exercise of the somnolent faculties, to bring constitutions of much energy into the passively impressible condition. This is but the highest form of the mental impressibility, which is manifested in all the relations of life in the control of the inferior by the superior being.

The power by which an operator controls his subject, by word of command, is not in reality a form of what is technically called Animal Magnetism. It is simply a higher illustration of that men-

tal impressibility which is displayed in all the daily intercourse of men. But before the wonders of the somnolent state were revealed by "animal magnetism," it was entirely unknown that man could be placed by any operation, or by any act of his own, in so passively impressible a condition—so utterly incapable of resisting the commands, or disbelieving the assertions of others.

The results of this mental impressibility are scarcely less wonderful than those of animal magnetism, yet they should not be confounded, as there is an obvious line of distinction. The phenomena of animal magnetism arise from a subtile influence, proceeding from one individual to another, independent of any obvious impression upon the senses, or any appeal to the conscious intellect: whereas, the phenomena of mental impressibility arise entirely from impressions upon the senses affecting the mind, and from ideas presented to the intellect as motives to influence the will. Every act toward a fellow being is an illustration of our mental impressibility—the influence that each exercises upon others by means of palpable objects and perceptible motives. From these, the phenomena of animal magnetism are widely distinguished by presenting the wonderful fact, that one human being, independent of sight or sound, without addressing any motive to the mind, and without any communication by speech or writing, exerts, by some mysterious agency, a controlling influence over others. The highest forms of mental impressibility are almost as wonderful as the phenomena of animal magnetism, yet in principle they are essentially distinct. In popular language, all passes for "animal magnetism;" and, doubtless, if animal magnetism had not been practiced, the higher forms of mental impressibility would not have been discovered.

Yet the world has long been *acting* upon the same principles, in reference to mental impressibility, which are now illustrated in the popular lecture room. It is true the audience are not requested to fix their eyes upon any object, upon the speaker, or upon a mesmeric coin; but the same care is taken to favor mental impressibility whenever it is designed to make a strong impression upon the mind. When the truths of religion or of science are to be impressed upon the mind, the conditions of passive impressibility are generally demanded by the speaker. The audience are placed in a calm, patient position, with their attention concentrated upon the speaker, and under the sound of his voice, for as long a period as may be convenient. In this condition all the animal organs of the brain are tranquilized; the selfish, hostile and resisting forces are at rest, and the perceptive organs are necessarily predominant: these are the conditions of mental impressibility. While the organs of the frontal and superior regions of the brain are thus kept in their predominant action, the mind will be accessible to the influence of any impression. But if the audience be disturbed by rising to the feet, or walking about, it will require unusual intelligence and eloquence in the speaker to make any impression upon their minds. Or if any

angry or disagreeable passion should be made to disturb the predominance of the amiable and intellectual organs, the influence of the speaker is lost, and he fails to make any impression upon their minds. Hence the assiduous care of the orator to awaken pleasing impressions in the minds of his auditors—in other words to preserve the only frame of mind in which he can make a successful appeal. In addition to pleasing, elevating, genial and humorous remarks, the influence of music is often added to concentrate still more effectually the mental excitement in the anterior and superior regions of the brain.

By thus acting upon the laws of mental impressibility, public speakers exercise an immense influence over the minds of their auditors; and thus the destiny of mankind is molded in churches, schools and public assemblies, where the mass, in a state of stillness and impressibility, submit to be stamped by their teachers. In this manner, at the present time, the enlightening and elevating influences of society are brought to bear upon the masses. Unfortunately, those who teach and affix their own stamp upon the public mind, are too generally themselves imperfect and unsound in their knowledge. Too frequently, indeed, they exert a pernicious influence.

If the laws of mental impressibility have been sufficiently developed to enable us to exercise an absolute control over passive subjects, why should not society take hold of all its subjects, and by means of this power elevate them to virtue and intelligence? I refer not merely to the power of education for the young, but to the power of reforming, through mental impressibility, those who are at present unhappy and criminal. Why should we abandon the unhappy convict to his sad fate, when science has demonstrated the unlimited extent to which mental impressibility may be increased—the absolute power which may be exerted over all faculties of the human mind? When the adult human being, no matter how old or confirmed in his habits, may become passively impressible, why should we abandon as incurable the mental infirmities of criminals? Why should we not aim to re-excite the torpid moral faculties—to restore the lost balance of character—to regenerate our fellow-beings? Would it not be a splendid achievement for the science of man, to demonstrate that our convicts may be restored to a happy and virtuous life? That such a result will ultimately be obtained by proceeding upon the well established laws of mental impressibility, I do not doubt.

If our modern experiments demonstrate anything, they demonstrate that mental as well as bodily functions may be controlled by the proper means; and that there are moral medicines no less efficient for the mind than the doses of the apothecary for the body.

The PHYSICAL IMPRESSIBILITY of man is as familiarly known as the impressibility of his mind; but the most interesting and wonderful discoveries upon this subject are of recent origin. That man may be affected by physical violence, by heat and cold, by

electricity and other imponderable agents, by atmospheric changes, by food and by medicine, is a well known fact. But few have suspected the delicacy of the influences that are capable of affecting the constitution of man. Few have suspected how slight an atmospheric change, or how small a quantity of medicinal substance, may produce a powerful effect. The wonderful acuteness of sense displayed by animals and by savage tribes, has failed to awaken a proper sense of the wonderful endowments of the nervous system. The astonishing facts of Homœopathy have given us the first extensive demonstration of the susceptibility of the human constitution to the influence of incredibly minute amounts of medicinal substances.

The extent of our physical impressibility is at the present time entirely unknown among Allopathic medical writers, and a profound ignorance upon the subject exists in medical schools. It is taught by physiologists of the present time, that no substance whatever can affect the human economy, except by coming into actual contact with its nerves, or by being introduced into the mass of the circulating blood, with which it may enter the interior structure of our organs. It is supposed that in all cases in which a medicine produces any sensible effects, the particles of that medicine must either be placed in contact with our sentient nerves, or must be absorbed in sensible quantities. Indeed, a physiologist who should presume to teach any other doctrine, would be considered no less visionary and absurd than was he who first taught the circulation of the blood. Nevertheless, this dogma of the schools—that absorption or contact with the nerves is necessary to any medicinal impression—is grossly false, and may easily be refuted.

Every substance which is in contact with the exterior of our bodies, whether it be absorbed or not, exerts its medicinal influence. That the influence of any kind of medicine may be produced by simply sprinkling it upon the skin, is a well-known fact. But in these cases it is supposed—no matter how promptly the influences may be produced—that they result entirely from the absorption of its substance. These suppositions can be effectually refuted only by inclosing the medicine in a substance through which its particles cannot pass; and thus ascertaining whether it produces any effect where absorption cannot possibly take place.

If we take a small quantity, as an ounce or more, of any active medicine, envelop it carefully in paper, and place it, so enveloped, between the hands, we will ascertain the amount of influence which may be exerted over the system, without any possibility of absorption. There are many who will not experience any influence sufficiently decided to be regarded. But if we perform the experiment upon a number of individuals, we cannot fail to find those whose physical impressibility is sufficient to realize the whole medicinal impression. With a little patience, and a repetition of the impression, we shall find those who can rapidly ascertain the influence of any medicinal substance distinctly, even when thus

enveloped, and who will be able to describe its properties in a minute and thorough manner. Many physicians of my acquaintance are able, not only to determine the class in the Materia Medica to which the article belongs, but to identify the article itself, and give its name, in consequence of their thorough knowledge of its medicinal impressions. The experiments of this kind referred to in my essay on Psychometry, show that, under favorable circumstances, nearly one-half of those who are made the subjects of experiment, will realize a medicinal impression from substances with which they are not in actual contact.*

This clearly proves that the palpable particles of the medicinal substances do not need to enter the circulating medium, or to come into actual contact with the nerves. It may still be supposed that although an absorption of gross particles may be unnecessary, there may be a delicate aroma, or gaseous emanation, by means of which some more subtile particles may be imparted and absorbed. It may be supposed that this occurs through the pores of the paper used in the experiment. But even this refuge of materialism cannot be maintained; for if the medicine be inclosed in a glass vial hermetically sealed, individuals will be found, of a high grade of susceptibility, who will recognize the same medicinal influence—even through glass, although in a slower and more gradual manner—nay more, even without contact with the medicine or its envelop! A galvanic current is capable of conveying all these medicinal influences into the system, and we may be narcotized, purged, vomited, stimulated, or tranquilized, without contact either with the medicine, or the envelop in which it is contained.

Such being the extent of man's physical impressibility, it follows that we are continually liable to be influenced by currents of imponderable agents, conveying the mysterious influences of surrounding bodies. Thus may we solve the problem of endemic and epidemic diseases!

The progress of the human race in education and refinement, increases the power and ascendency of the nervous system. As this power increases, so does our susceptibility to delicate and impalpable agencies become developed. Since the world is gradually preparing to lay aside its cumbrous machinery of military force, prisons and barbarous punishments, and to rely on gentler and more moral influences—the medical profession is also slowly learning that huge doses of drastic medicines, profuse purging, depletion by the lancet, and other measures, which might have been tolerated by the rude constitutions of a barbarous age, are entirely unnecessary as well as injurious, and that the gentler agents of the Materia Medica, the

* The experiment, however, is not limited to medicines enveloped in paper: fluids contained in vials or bottles will answer the same purpose, for the glass interposes no great obstruction. [Last evening I performed a number of experiments upon Professor S., and he recognized promptly the true medicinal influences of the contents of each vial that I placed in his hands, viz., tinct. leptandrin, tinct. apocynum, tinct. iodine, ess. peppermint, sweet spts. nitre, and tinct. sanguinaria.

delicate appliances of Homœopathia, animal magnetism, and psychological medicine, are entirely sufficient for the treatment of diseases. We are now in the transition state, when the more rude and barbarous forms of education, government, medicine, &c., are gradually settling down to their proper level, to make room for something more congenial to the progressive refinement of the age.

Having thus glanced at the phenomena of Mental and Physical Impressibility, let us advert to the third form of human impressibility, the philosophy of which is almost entirely new.

SYMPATHETIC IMPRESSIBILITY is the very foundation of Anthropological science, and furnishes the means of introduction to the mysteries of the Outer as well as the Inner. World.

ART. V.—RESEARCHES IN ORGANIC CHEMISTRY.

BY DANIEL VAUGHAN.

THE merits of theories in natural science must be determined by observing how far they are confirmed by facts and experiments, and how they serve to explain or predict the phenomena of nature. It must be admitted, however, that even this method of conducting scientific investigations, though the best that could be adopted, cannot be regarded as always infallible. Seldom, indeed, has there been an operation of nature revealed to us, which has not been found susceptible of different modes of explanation; and the same facts and experiments have been frequently adduced to sustain two conflicting systems of philosophy. But the sources of error may be removed, in a great measure, by enlarging the sphere of our observation; for though we should inevitably err when we confine our attention to a few facts, the examination of a greater number must tend to rectify our views, and must cause a continual advance of the mind in the road to knowledge.

In modern times, a taste for useful information has led to the examination of the operations of nature on a more extensive scale than was formerly pursued, while a more exact mode of conducting experiments has rendered the results of modern researches more worthy of confidence. Indeed, every age must add something to the stock of scientific truths, by revealing new facts; and, consequently, every succeeding generation must possess increased resources for prosecuting investigations in science, and for arriving at useful discoveries. To avail ourselves of the greater advantages we thus possess for unfolding the mysteries of nature, and to guard more effectually against error, it will often be necessary to submit to a strict inquiry many theories now received, especially

those advanced in less enlightened ages, when there were no tests sufficiently rigorous to discover or to correct their defects. If the doctrines set forth in them be well-founded, they will only receive additional proofs from every new inquiry instituted to test their accuracy. If they prove to be erroneous, they must share the fate of many other systems of ancient philosophy, and give place to theories emanating from more correct principles, and better calculated to advance the interests of mankind. This plan of searching for truth is, perhaps, quite repugnant with the custom prevalent among many persons, whose prejudices are always enlisted against every new discovery, while they receive, with the utmost credulity, those systems which have descended to us from former ages.

The theories advanced, at different times, in regard to the nutrition of plants, will furnish an illustration of the progressive state of the human mind in the discovery of truth, and of the advantages to be derived from the observation of numerous facts. There are, indeed, in this department of science, but few facts which can be considered as well established, and many of them are no less difficult to be proved than the theories which they are intended to confirm. The experience of all ages, however, concurs in showing an intimate connection between the state of the soil and the luxuriance of vegetation. When a certain crop has been cultivated on a piece of land for several years in succession, after some time the produce diminishes every year—especially if no manure be applied—and finally the land becomes, in a manner, incapable of producing the same crop any longer. The land thus appears to have lost its fertilizing principle in supporting the crop, but, unlike a mine deprived of its treasures, does not remain forever in a state of sterility. Having lain unproductive for a few years, it is found capable of producing the crop to which it previously refused sustenance. These facts were observed from time immemorial, and, during ages of ignorance, were accounted for by the opinion that the land possessed some species of vitality, or had some analogy to living beings. It was supposed that, like man and animals, the land required a rest, and that this rest was obtained both during the winter, when vegetation was suspended, and during the time of fallow, or the time when it lay unproductive. In accordance with these views, the Romans established throughout their extensive dominions the biennial system of culture, by which the land was to be cultivated only every second year. To this succeeded the triennial and quadrennial systems, in which the land remained every third, or every fourth, year unproductive. These systems of culture, especially the last, are still retained in most parts of Europe, and have their advocates even among scientific men; but the fanciful theory first associated with them, as well as the idea of a creative power in the soil, or in plants, have been long rejected by all intelligent persons, and seem more adapted for the fables of mythology than for the records of science.

The theory of Alchemy presents us with another attempt to account for the leading facts connected with vegetation, especially for the perpetual source of fertility which the land seems to possess. Believing it absurd to suppose that plants created the substances of which they are composed, the alchemists maintained that all bodies were composed of fire, air, earth and water, which they believed to be the four elementary or simple bodies. Seeds and plants were supposed to possess the power of converting these four elements into various vegetable productions. Their vital principle was even believed to be capable of effecting, in like manner, the production and transmutation of metals; and hence originated their unwearied exertions in searching for the seed with which they hoped to be able to convert earth into gold. Extravagant as such opinions may now appear, they were, perhaps, as reasonable as we might expect to see formed from the few facts with which they were acquainted, and from the imperfect experimental knowledge which they could acquire. Besides, it was natural to expect that vegetation, which so far transcends even modern chemistry in transforming bodies, might furnish the means of accomplishing any object, however difficult. Instead, therefore, of censuring the folly or ignorance of the alchemists, whose doctrines have long been exploded, we should learn to proceed with caution in all our inquiries in science, especially when our knowledge is too circumscribed or too imperfect to give any degree of certainty to our conclusions.

During the 17th century, it was currently believed that water alone was the food of plants, and this opinion was supported by so many facts and experiments, that, at one time, it was regarded as an established truth of natural science. It was observed that water was absolutely necessary to plants during every stage of their growth, and that when deprived of water, they exhibited symptoms of decay analogous to what is witnessed in animals deprived of food. It was also well known, that in lands where little or no rain falls, as in deserts, vegetation is altogether wanting, and that it proceeds luxuriantly, even in such localities, whenever water is supplied from springs, or from other sources. In warm climates, indeed, irrigating, or watering the land is found sufficient to restore it to fertility, and it even appears capable of supplying the place of every species of manure. To furnish an experimental proof of the nutritive properties of water, different kinds of trees were made to vegetate in a limited quantity of earth, and supplied with nothing but distilled water. After some years, it was found that the accession of weight which the trees received was several times greater than the loss which the earth sustained, and from this it was concluded that the plants received the principal portion of their food from the water. It was accordingly supposed that water was the proper nourishment of vegetables, and that their vital energy was capable of converting it into the various substances which they contain. Subsequent researches, however, have shown that this opinion is erroneous, as it is now proved, satisfactorily, that carbon,

the principal ingredient of which vegetables are composed, cannot be supplied by pure water, and must be derived from some other source.

It was next supposed that air and water, conjointly, furnished the food of plants; and the beneficial effects which land received when permitted to lie in fallow, were attributed to the acquisition of nutritive matter from the air. From the benefits resulting to the land by aeration, Tull proposed to supply the place of manure by constant tillage, by which the influence of the atmosphere on the soil would be considerably augmented. A few years, however, was sufficient to show that this system of culture, though possessed of many advantages, was very defective. Though at first attended with a considerable increase in the amount of crops, the excessive tillage and constant growth of plants, instead of augmenting the fertility, continually diminished it. It may be necessary to remark that air, in a state of purity, does not contain carbon; but this element may be derived from certain gaseous substances which are always found in the atmosphere.

The opinion that plants derive their carbon from carbonic acid, has, during late years, called forth much discussion, and has been advocated and assailed by many eminent writers. Though it has been considered absurd to suppose that the vital principle of plants possessed the power of creating the materials of which they are composed—or to believe, with the alchemists, that it was capable of affecting a transmutation of the elements of bodies—yet it has been supposed reasonable to ascribe to this vital energy the power of overcoming the greatest force of chemical affinity, in decomposing carbonic acid, and in converting it into various vegetable productions. Carbon, indeed, has a powerful affinity for oxygen—sodium and potassium being scarcely capable of decomposing carbonic acid in its gaseous form. These substances are not to be found in plants in an uncombined state; so that the decomposition which is supposed to take place in plants, must depend on a power, and (to use the words of Liebig) a capability of assimilation, to which the most powerful chemical action cannot be compared. Since the chief proof of the impossibility of plants to transmute the elements of bodies is derived from the fact, that chemists have hitherto failed to effect any such changes, the carbonic acid theory, in ascribing so much to the vital energy, appears not altogether free from the objections so often urged against the speculations of the alchemists. Circumstances, indeed, modify the force of chemical affinity, and the powerful attraction which retains the elements of carbonic acid (as I shall prove in another place) is diminished in a very great degree, when this gas is combined with water. But such a solution is inadequate to supply a sufficient quantity of carbon to growing plants, and, accordingly, it is maintained by the principal advocates of this theory, that the leaves and green parts of plants must possess the wonderful energy required to decompose the carbonic acid contained in the air around them.

This decomposition is supposed to be effected chiefly through the agency of light. The solar rays are known to have some influence in chemical combinations, but their deoxydating power is very feeble, and, it being scarcely adequate to separate oxygen from silver or mercury, we should not be inclined to believe that it was capable of separating oxygen from carbonic acid, in its gaseous form. From different experiments it has been concluded, that the decomposition of carbonic acid by plants takes place only during the day, and that it is entirely suspended at night. Before noticing these experiments, it may be advisable to examine several doctrines deduced from them by late writers. Carbonic acid is supposed by them to be the only form in which carbon can become the food of plants, and nearly all the carbon they contain is said to be obtained directly from the atmosphere. According to Petzholt, neither the roots nor the soil are essential to vegetation. In support of this, he refers to a number of marine plants, in many of which roots are absent, or are, at least, too small to supply adequate nourishment. But if the growth of marine plants furnishes one or two exceptions to the humus theory, it is certain that it presents us with certain facts which must be considered as subversive of the opinion that vegetation can be supported only by the decomposition of carbonic acid. As this decomposition is arrested by the absence of light, it can never take place in the greater number of marine plants, many of which receive less light than is to be found at the surface of the earth during the darkest nights. Even vegetation on land presents no less difficulties to this theory. The lichens, which grow in northern climates beneath the surface of the snow, are equally secluded from the light, while the fungi, and the flowers of all plants, continually emit carbonic acid, instead of withdrawing any from the air.

A very plausible explanation might be given, by this theory, for the formation of wood and other products from carbonic acid, if the light could penetrate the trunk of the tree, where these substances are formed: but, since the light cannot extend its influence here, the leaves are supposed to be the place where all the carbonic acid must be decomposed. When this decomposition, however, takes place, the work is but half done, as the wood must be formed, not at the surface of the leaves, but in the stem. By supposing the carbon which results from the decomposition to be soluble, we may possibly conceive that it might be conveyed to the stem by the motion of the sap; but how is it consolidated and formed into wood? This question shall be answered by one of the most celebrated writers on this subject. "The wood of the stem," says Liebig, "cannot be formed *quasi* wood in the leaves, but another substance must be produced, which is capable of being converted into wood. This substance must be in a state of solution, and accompanied by a compound containing nitrogen: it is very probable that the wood and the vegetable gluten, the starch granules and the cells containing them, are formed simultaneously; and, in this case, a certain fixed proportion between them would be a condition necessary for their production." But

the opinion that a compound of nitrogen could effect these changes, unsupported as it is by proofs, is contradicted by several incontestable facts. Mushrooms, cabbages, and most other plants which exhibit the most imperfect formation of woody fiber, contain the largest amount of nitrogen, while nitrogen is almost entirely absent from all trees and plants which have the greatest solidity of tissue. The conjecture in regard to the fixed proportion, while it seems designed to protect the theory from proper experimental tests, gives no light to practical culture; and the man whose trees suffer from the exudation of gum (a disease ascribed by Liebig to an undue proportion of nitrogen), is left at a loss to know whether he must increase or diminish the portion of nitrogen which they receive.

The formation of wood, starch, gluten, &c., from the air, in this manner, instead of partaking of the simplicity of all the operations of nature, depends on a contrivance so complicated, that it should be wonderful if it could successfully operate, even for a single day. To form one or both substances in the leaves, to convey them to the trunk, to prevent their union till they reach their proper destination, to give them solidity at this time, and form substances depending on the nature of the plant, and not on the amount of nitrogen, must be a very complex operation. The difficulties, however, do not stop here. The woody matter of the leaves must be formed from the vegetable juices of the sap, or, perhaps, from the air: and we see no reason why this formation should cease during the summer—as the causes which first produced it still exist, and operate more vigorously than before. Yet solid wood is formed in summer, not at the leaves, but in the stem—and at the end of summer, instead of wood, soluble substances are produced, consisting of sugar, starch, extract, &c. These changes are accounted for, by supposing that nature has assigned a limit to the size of the leaves, and that these organs are employed during autumn in creating a supply of starch, sugar, &c., as provisions necessary for the production of the buds and leaves on the ensuing year. It is, however, well known that the size of the leaves may be made to vary by the application of certain manures, and that a development of buds and leaves takes place when a tree is deprived of its foliage during summer, and when no such provision has been thus made for giving them existence.

If we admit that the atmosphere is the source of carbon to plants, or if (as Saussure maintains) it supplies them with about thirty times the amount they derive from the soil, we should conclude that every land should be almost equally productive, and always retain its fertility—since the atmosphere contains nearly the same complement of carbonic acid in all places. An excess, indeed, occurs in the air in elevated situations; but, instead of affording an increased supply of nourishment to plants, it appears to have a contrary effect—since vegetation is evidently retarded in such places. To meet this objection, and to account for the sterility of some lands, it has been found necessary to advance a new doctrine in

regard to the ashes of plants. It is contended that they require for their growth, certain inorganic ingredients furnished by the soil, and that these ingredients, though incapable of supplying carbon (as the alchemists believed), imparted to plants the power of obtaining it from the atmosphere. A proper supply of these substances is supposed to be capable of rendering every soil highly productive, and of renovating exhausted lands. The beneficial effects of lime, gypsum, soda, potash, &c., as manures, have been long known to practical farmers; but it is generally agreed that their fertilizing properties are chiefly to be observed on lands rich in vegetable mold—that they are of little use in exhausted lands—that they do not supply the place of organic matter, and that their influence is never so apparent as on their first application. These, and other facts, appear to sustain the common theory of their action, which ascribes to them the power of rendering the inert vegetable mold available for the food of growing plants. Liebig, however, supposes that it might be possible to supply the place of organic manures or humus, by determining the substances which every plant requires from an analysis of their ashes, and by supplying such as were not present in the soil. But the mineral manures prescribed by this chemist have been tried in England and Germany, and cannot stand the test; and his attempts to reduce his theory to practice, have resulted in the most signal failures. (See report of the Commissioner of Patents, 1847; p. 218–225.)

While it was believed that carbonic acid was the only form in which carbon existed in the air, the theory of its nutritive properties to plants seemed to be proved by the partially successful attempts to grow plants without mold, and by the facts already noticed in favor of the opinion, that their nutrition was derived from water. But recent experiments show that a quantity of carbon, equally large, exists in the air, from which carbonic acid has been removed. Though we have positive evidence that it is combined with hydrogen, yet it seems premature to conclude that it must be carburetted hydrogen, as it probably contains a portion of oxygen, not detected by the modes of analysis hitherto pursued. This compound may supply food to plants as well as carbonic acid, and may be considered a more fertile source of carbon, as the latter is decomposed with so much difficulty. It is known, moreover, that humus exists in water, and in air in the form of dust, so that we have reason to believe that much of the carbon of plants, when grown without mold, was derived from these sources. It is found, indeed, that many inorganic substances, if previously exposed to the air for some time, will become capable of sustaining vegetation, evidently from the acquisition of organic matter; and it may be worthy to remark, that clay (which is so retentive of moisture) acquires this property in the shortest time—as an exposure of a few months will render it capable of "sustaining crops without manure, even when it previously contained no animal or vegetable matter." (Allen.) Without this exposure, no inorganic substances will bring

plants to maturity, even with the assistance of carbonic acid. It is well known, also, that when a proper supply of organic matter is absent, vegetation languishes; and all experience disproves the assertion, sometimes made by the advocates of the carbonic acid theory, that manure and humus have no influence in the carbon of the harvest. Equally illusive are all arguments deduced from any occurrence at the commencement of the world, on which our information is so very limited. "Whence," says Liebig, "did the first plants derive their humus?" It would be, however, as difficult to discover whence they obtained their carbonic acid, and it is reasonable to suppose, that organic matter was created in a solid as well as in a gaseous form.

With regard to the two conflicting theories respecting the office of these two substances in vegetation, though both are liable to objections, yet most facts, hitherto observed, must compel us to decide in favor of the nutritive qualities of humus. It is capable of supporting all species of plants, while scarcely any of them have been benefited by the application of carbonic acid. Professor Schleiden, indeed, remarks that some species of the confervæ grow more luxuriantly in a solution of carbonic acid, than in pure water, or in a solution of humus; and this fact is supposed to establish the carbonic acid theory to the exclusion of the other. But experiments on other plants will furnish many thousand such proofs in favor of the humus theory—and these proofs are more conclusive, as perfect plants were the subjects of experiment. Indeed, carbonic acid appears injurious to most vegetables, when applied in any considerable quantity, and many have been destroyed by a portion of it too small to supply them with a sufficiency of carbon. In many of these experiments, the noxious effects resulting from confinement in a limited portion of air, must render the evidence we obtain somewhat unsatisfactory; but it appears unwarranted to deduce from this circumstance an argument in favor of the carbonic acid theory. "A plant," says Liebig, "placed in a closed vessel in which the air, and therefore, the carbonic acid, cannot be renewed, dies exactly as it would in the vacuum of an air-pump." But the injurious effects in this case cannot be ascribed to the want of carbonic acid, since whatever quantity of it is supplied, or however the supply be regulated, the same destructive consequences will not be prevented, but will inevitably result from confinement.

It has been supposed that the information derived from an analysis of the atmospheric air would throw much light on the operations of the vegetable kingdom. Notwithstanding the continual production of carbonic acid by combustion, by respiration, by the decay of vegetables, by volcanic exhalations, no permanent increase has yet been detected in the amount the air contains; and, accordingly, it has been concluded that it must be decomposed by plants. But, admitting that it is removed from the air, does it follow that there can be no other means of effecting its removal? It is certainly as reasonable to suppose, that the mysterious power which

effects the decomposition, should reside in the air, in the land, or on the water, as to believe that it should be confined to tender leaves. Experiments, indeed, show little connection between the purity of the air and vegetation. Were the air purified by plants (as is generally supposed), the least quantity of carbonic acid should exist in the atmosphere in the end of summer, and the greatest in winter when none is expended in giving them nutrition. The most accurate experiments, however, prove that the quantity is least in winter, and greatest at the end of summer, when it is nearly double the amount at the former period. After rain, also, the amount is found to have diminished considerably, a phenomenon which cannot be ascribed to absorption alone. When boiled water has been exposed to the air for a considerable time, it will be found to contain (according to Johnston) only the one-six-thousandth of its volume of carbonic acid; and (according to Boussingault) river-water, which must have acquired much from other sources, contains only one-fiftieth of its volume; so that no perceptible quantity could be thus separated from the air. When, we consider, also, that the yearly amount of carbonic acid must be increased by the combustion of bituminous coal and volcanic eruptions, while the extent of arable land on our globe is nearly invariable, we must conclude that some other means must be designed to preserve the balance of organic nature.

The chief argument in support of the opinion that plants obtain their food from the atmosphere, is derived from the fact, that carbon is taken away every year from a forest or meadow, in the form of wood or hay without diminishing the amount of carbon in the soil. "The mere observation of a wood or meadow," says Liebig, "is infinitely better adapted to decide so simple a question, than all the trivial experiments under a glass globe." But, like the purification of the atmosphere, the accession of carbon which the land must receive in these instances, appears to be independent of vegetation. Clays having no organic matter, acquire fertilizing properties (as I have before observed) by a few months' exposure to the air. When exhausted lands, also, are permitted to lie in naked fallow, they will be again restored to fertility and acquire productiveness, in proportion as they have been kept free from weeds. Though there are, perhaps, at present, more improved methods of effecting the same object, practice has almost universally admitted, that land thus treated becomes more productive, notwithstanding the waste of humus by fermentation. The fallowing system is extensively pursued in Germany and Naples—and, according to Liebig, is the great cause of the permanent fertility in the latter place. He, however, attributes the restorative effects to the liberation of a portion of alkalies by the disintegration of rocks; but experience has shown that land, exhausted of humus, is not benefited by the application of inorganic substances. Indeed, to ascribe the increased fertility of a meadow to the acquisition of carbon from the air, while a similar increase of productiveness in fallowed lands is as-

cribed to a different cause, betrays a partiality unfavorable to the cause of truth.

This, and other theories in regard to fallowing, seem to have originated from the desire to render the doctrines of agricultural chemistry more acceptable to the practical farmer. Reasoning from the theory of nutrition, and from the continual waste to which humus is subject, scientific men long declaimed against the system of fallowing, and insisted that it would reduce the land to sterility. But their views were found so repugnant to the results of practical culture, that at last the term, "book-farmer," became a reproach which few were willing to receive. Many explanations were offered by several writers for the effects produced by this mode of culture, but most of them so unsatisfactory that they have been rejected by agricultural writers, many of whom still maintain that fallowing produces sterility. The book-farmer may reproach the practical man for his ignorance or stupidity in not appreciating the doctrines of chemistry, but he is, perhaps, more deserving of blame himself, in looking with so much contempt on the result of the experience of several ages.

The experimental evidence in favor of the decomposition of carbonic acid by plants, is much less conclusive than that usually adduced to establish the truths of science, and in many instances is very unsatisfactory. In a recent publication, Professor Mapes proposes to cut off a twig from a plant and to analyze the gas emitted from the sap. There is little doubt that the gas will prove to be carbonic acid; but instead of concluding, with the writer, that this acid must be the proper food of the plant, we should suppose that it was produced by the fermentation of the vegetable juices. In the experiments on plants in a confined portion of air, it is found that carbonic acid, when supplied in a very small quantity, diminishes during the day, and is replaced by oxygen and nitrogen; but during the night it increases, and the oxygen is consumed. According to Ellis, more oxygen is consumed in these operations than is produced, and plants thus vitiate the air; while Danberry and Saussure and others, find a considerable balance in favor of their purifying principle. The last chemists, in their experiments, suspended their trials, or took no notice of the results when the plants became unhealthy, or appeared to suffer from confinement. It is difficult to decide whether this was the proper course to be pursued; and, since the evolution of oxygen does not continue for any considerable time, we cannot conclude with any degree of certainty in regard to the office attributed to plants. Saussure, in his experiments, found a considerable increase of nitrogen as well as oxygen, and Boussingault supposes the nitrogen to be derived from the vegetable juices being displaced by the oxygen. Were this opinion well founded, there is nothing to prevent us from concluding that the oxygen, as well as the nitrogen, may come from the vegetable juices, both being displaced by the carbonic acid; and it is a remarkable fact, that the latter gas almost exactly equals the two

former in volume. In addition to this it may be proper to notice, that Professor Shoultz, an eminent German chemist, has proved by several experiments, that the vegetable juices, when exposed to the solar light, give off oxygen; and this fact seems to invalidate much of the evidence hitherto adduced in favor of the theory of Priestley. However, all experiments on plants, though perhaps insufficient to show conclusively what part must be assigned to their vital principle or to their organs, have, at least, concurred in establishing the important fact, that the solar rays have a great influence in separating oxygen from vegetable substances, and probably from carbonic acid.

The tendency of the human mind to adhere to all preconceived opinions, often obviates the good effects resulting from the most profitable system of investigation. In the first galvanic experiments, the body of an animal recently killed was used as an essential part of the apparatus, from a belief that the production of electric currents was dependent on animal life. Had this practice been continued till the present time, the experiments on galvanism might have been as unproductive of discovery, as those which have been performed during the last seventy years for decomposing carbonic acid by means of plants. There is much reason to believe, that in the decompositions which have been observed, the living plant acts a part not more important than that which the animal acted in the production of galvanic currents. The purification of the air, and the acquisition of carbon by the soil, is, as I have already shown, independent of growing plants; and we have much reason to believe, that the same is true of the decomposition of carbonic acid in confined atmospheres. The idea that vegetation alone can effect this decomposition, has originated from some incorrect doctrines respecting chemical affinity. But the consideration of these shall be reserved for a future article.

(Having thus refuted the fashionable theories, I presume Mr. Vaughan will proceed to show, in his next essay, the simple laws of nature which he has had the honor of discovering, by which the atmosphere is purified, the land fertilized, vegetable growth effected, and nourishment prepared for man. The importance of his discovery is obvious, when we reflect that, without the chemical process which he has demonstrated, there could be no fertility, no vegetation, and, consequently, no animal life. As to the decomposition of carbonic acid and evolution of oxygen, I would remark, that, in the experiments of Dr. Aldridge of Dublin, a few years since, the *senna minor*, when placed in an inverted jar full of water, and set away for a week in a totally dark cellar, evolved in the jar near two cubic inches of oxygen gas.—Ed. Journal.)

Familiar Table-Talk.

EUROPEAN AFFAIRS.—The saddest tale that ever was told by history or by fiction, is the story of famine and death in Ireland. Almost every newspaper, for many months, has been burdened with the story of Irish miseries. Under a government PROFESSEDLY CHRISTIAN, the head of which is ex officio "*defender of the faith*" and head of the church, A WHOLE NATION HAS BEEN DESOLATED. It would be a very moderate estimate to say that, directly or indirectly, MORE THAN A MILLION of men, women and children, have perished of destitution in Ireland. For three or four years past, about one-half of all the Irish people have been in a state of partial or total pauperism. And there is no relief—no prospect of relief—but *death* or *flight*.

The *pious government* of England is there (a government so pious that it cannot accord to Jews the rights of other citizens for fear, as the Lords and Bishops say, of overturning Christianity)—the holy Church of England is there—and from these two powers there is no escape but in the massacres of war, or in emigration to foreign lands, for which the poor victims sigh in vain in their poverty. Yet, while the woes of Ireland have awakened the sympathy of distant nations, while America has contributed liberally, and even the Sultan of Turkey has subscribed for her relief, the vampyre church of England extorts from her miserable people, from eight to ten millions of dollars annually, to support a profligate and unfeeling priesthood. Not satisfied with grinding the Irish in the dust by a system of despotism and extortion, the influence of Christian England has been exerted to prevent Mohammedan Turkey from relieving poor Ireland. When the Sultan of Turkey wished to donate ten thousand pounds for Irish relief, the English Minister interfered, and protested against so generous an act as calculated to discredit his own sovereign, who had given but two thousand pounds—and accordingly the donation was reduced from ten thousand to one thousand.

The facts of Irish suffering are too grave and momentous to be overlooked by the Journal of Man—they should be recorded, preserved and dwelt upon, until they lead to the adoption of some adequate plan of prevention and relief. The fact, that those systems of society, government and religion, which are now in the ascendant, have led to such deplorable results, should induce us to re-examine the foundations of society. No state of anarchy—no French revolutionary "reign of terror"—no convulsive and bloody struggles for freedom, have ever produced so deplorable results, so vast a sacrifice of life, as the Government and Church of England in a time of peace have brought upon Ireland. The sacrifice of

life in France, during the first French revolution, has often been made the theme of declamation from the pulpit and rostrum, but when ten times as great a sacrifice of life is decently and quietly perpetrated upon the poor, obscure laborers of Ireland, by a sanctimonious government and church, why is not a proportionate horror felt? Does the fact that England is our ancestral land, that she speaks the same language, or that she makes pharisaical pretensions to religion, suppress our horror of this wholesale legal slaughter?

Mr. Stanton, the able foreign correspondent of the National Era, sketches the condition of Ireland, as follows:

"But the English Church is only a blotch. The great sore is the Irish landlord system. The misgovernment of the country has conspired with landlordism to drive out capital, and destroy commerce, trade, mining, fishing, and manufacturing, thus throwing the mass of the population upon the land for subsistence. This has increased competition for the hire of the soil to an extent unknown in any other country, and has stimulated a grinding scale of rents, which has descended from the landlords to the middlemen, and from them to the small farmers, and from them to the poor laborers, growing more extortionate as it goes down, till the soil has been cut into minute pieces, which are held by short and uncertain tenures, precluding permanent improvements, driving the mass of the people to the raising of potatoes, because they are cheap in the cultivation and prolific in the crop, and yearly turning thousands out to beg, starve, rob, die of disease, or shoot their lessors at the expiration of their terms. One-third of the people of Ireland live (if they live at all) on potatoes, and the addition of a sprinkling of salt is a rare luxury. Two and a half millions are beggars, and Mr. O'Connell estimated the paupers in 1846–'7 (the years of famine) at four millions. The main reliance of nearly half the nation, for food, is potatoes. God have mercy on them when that source fails!

"With many noble exceptions, the large landed proprietors of Ireland are heartless, reckless, thriftless men. Nearly one-third of the country is a bog, three-fourths of which might be drained. Nearly five millions of acres, capable of cultivation, lie waste. An acre of potato land rents for from £5 to £10 per annum. Labor is abundant at the lowest rates. Yet these landlords have done little toward draining these bogs, inclosing these wastes, and improving their estates. Grant that for the three or four past years of pinching famine, attended with loss of rents, they have been unable to make improvements. It was just so before these years came, and has been so time out of mind. These landlords are generally *absentee* proprietors, who feel no abiding interest in the prosperity of a soil which they forage but do not inhabit, which they own but do not occupy. The very money voted to them in 1846–'7, by Parliament, for the improvement of Ireland, they spent the next season at Paris, Florence, and Baden-Baden, there to swell the pomp of

British aristocracy, while millions at home, whom it was intended to assist, ate garbage that an English pig would hardly nose over, or starved in hovels that the royal stag hounds would not skulk into from a pelting storm.

"The energies of the masses in Ireland being absorbed in a hand-to-mouth struggle for existence, they have neither time nor means to stimulate the industry of the country by establishing manufactories, opening mines, carrying on fisheries, increasing trade, laying out roads, &c.; nor to elevate and expand the national mind by founding common schools and seminaries of learning. The wealthy landlords and capitalists—the Besboroughs, the Lansdownes, the Devons, the Fitzwilliams, the Hertfords—who might do all this, will not; but, looking on from afar, cry to their stewards and agents, 'Give! Give! Give!'

"The result of this complicated system of bad government and bad management is painfully obvious. Ireland is nigh unto death of a chronic disease of famine, pestilence, agitation, despair, and insurrection.

"And what is England's remedial process for this disease in one of her members? As a panacea for the miseries that she herself has to a great extent inflicted, England, at stated periods, administers to her victim-patient coercion bills and cold steel, blotching her surface with police stations and military camps. Sending her tax-gatherers instead of schoolmasters, dotting her soil with cathedrals instead of workshops, sowing her fields with gunpowder instead of grain, England affects to wonder that the crop should be famine and faction, misery and murder, improvidence and insurrection; and when the harvest is dead ripe, she sends over police and soldiery, armed with coercion bills and cannon balls, to cut and gather it in."

The following extracts, from different newspapers, give a more vivid idea of the details of Irish suffering. An Irish paper says:

"Last week a man named Thomas Kelley lay for nights on the mail road leading from Newport to Achil, where he died of starvation, and remained exposed, a prey to the dogs, from Wednesday to Saturday. Within a few perches of said place a man of the name of Sweeny died of starvation in the same week, and on the road, where he remained some time exposed and unburied. Same week I saw about thirty men, under a steward named Stretton, breaking stones under a wall inclosing a farm, from which they (the men) were expelled, now lying waste. These men, if fed, were all suited to agricultural labor; the stones broken during the week, if in the London market, would not pay the steward's wages. Same week, the Rev. Mr. Scully, R. C. C., stated he attended a man dying of starvation, from whose mouth froth issued when bailiffs threw the ends of the house down. Same week, the wife of O'Donnell Smith, Knockluga, who died of starvation, was sent to the grave on a ladder, without coffin or covering. The Roman Catholic curate said he would undertake to load a cart with the

dead bodies of those who died of starvation, on any day, within seven miles. A person officially connected with the District, stated that fully one thousand persons must die, within the coming month, of starvation, as many of those who are on the relief list were getting only a few ounces of yellow meal daily."

"A letter from Waterford, alluding to the rush of emigration from that port, goes on to say: 'There is no blinking the question, that if the present emigration goes on much longer, there will not be sufficient labor left in Ireland to till half the land for the support of such as may survive the ruin that is apparent to all acquainted with the country. Its truth was naively and candidly allowed by Mr. Stephens, a solicitor, who, in the course of a case lately tried, expressed the almost universal feeling on that point. He said that if emigration continued much longer to thin the population, the cows would have to go six or seven miles to get milked.'"

"*Horrors of Famine.*—These last few weeks have been marked by unusual scenes of horror in the west. The details are absolutely sickening. Case follows case in rapid succession, each rising above the other in ghastly pre-eminence. I have known more than one individual turn shuddering from the papers, little more now than records of death and extermination, lest they might be haunted by the description of misery they could neither alleviate nor forget. Just imagine a dreary Connaught highway, dotted with the dead, and here and there a moving skeleton passing over it with the corpse of some loved relative slung across the back by a rope; and if that is not enough, imagine the body slipping from the exhausted bearer and the head knocking against the ground. This is no ideal sketch, no invention of a Fieschi-like imagination, but a plain, unexaggerated narrative of fact, sent to a metropolitan journal for publication, by a clergyman residing near the spot. The same individual describes other scenes of a like nature; hurrying on in the discharge of his sacred duty from one nucleus of pestilence to another, he passed a cabin under whose clay floor sleep in peace, three who formerly moved about that wretched tenement, clung to the world until utterly exhausted, and then let go their hold of life and were buried where they fell, slain by the sordid, inhuman economy of English statesmen, as surely and unerringly as if swept away by cannon, which would be the less agonizing death."

The following paragraph shows another mode in which the population of Ireland is undergoing a more permanent diminution:

"A remarkable decrease has occurred in the number of births in Ireland. In one county the falling off in 1848 was 90 per cent. An article in the London Daily News attributes it to the utter physical prostration of the people."

To what can we attribute the calamities of Europe but to the fact that the moral sentiment, which alone can save a nation from ruin, is disorganized, corrupt, perverted and miseducated. The greater portion of the religion of Europe is little better than a system

of "*organized hypocrisy*." European religion is everywhere in alliance with despotism, and in opposition to the rights of man. In England, which claims the highest degree of freedom, we see there is little or no true practical Christianity in the government. The fate of Ireland and of India make a bloody illustration of the character of English religion.

The holy alliance between a corrupt religion and despotic power, is well illustrated in the language of the Emperor Nicholas of Russia, recently addressed to his Bishops. The Emperor is reported to have said:

"'I do not wish for a new religion; a new sort of Catholic creed has been invented abroad, and I desire that it may not be introduced into my empire, because these inventors are the worst agitators—and without faith it is impossible that any thing can exist. The West at this moment offers a fair specimen of what men come to if they have no faith—how great are the follies and absurdities which they commit! Look at Rome; I predicted all that would happen there. Faith has entirely disappeared in the West. The manner in which the Pope has been treated is a plain proof that the true faith exists in Russia alone, and I hope (making the sign of the cross) that this holy faith may be maintained here. I told the late Pope Gregory XVI things which he had never heard from anybody else. The present Pope is a good man, his intentions are excellent, but his principles savor too much of the spirit of the age. The King of Naples is a good Catholic; he had been calumniated to the Pope, and now the Pope is compelled to have recourse to him.'

"Bishop Holowinski replied: 'Your Majesty, the Holy Father was obliged to yield to circumstances and the spirit of the age.'

"The Emperor: 'Very possibly; but all these disorders arise from want of faith. I am not a fanatic, but I have firm faith. In the West they have run to two extremes—fanaticism and impiety.'

"Addressing the Polish Bishops, the Czar continued: 'You are the near neighbors of these misguided men; let your example be their guide. If you encounter obstacles, address yourself to me. I will employ all my power to stem this torrent of impiety and revolt, which is spreading more and more, and threatens even to penetrate into my dominions. A revolutionary spirit is the result of impiety. In the West there is no longer any religious faith, and this evil will increase still more.'

"Addressing himself to the Metropolitan Bishop, and kissing his hand, the Czar concluded by saying, 'We have always understood each other, and I trust that it will always continue so.'"

Thus it seems, according to the Czar, that the spirit of liberty or republicanism in Europe arises entirely from the lack of faith, and that a sufficient amount of faith or religion would prevent all such disorders, and preserve in unshaken tranquility the most odious forms of despotism. In this view it seems his Bishops coincide.

It may be said, then, that the religion of Russia is but the religion of despotism, and as much like the religion taught by Jesus Christ as the basest copper counterfeit is to a coin of true gold. The governments of Europe, which all profess to be guided by this counterfeit system of religion, expend annually to maintain their military forces two hundred millions.

Acting upon the principle, that religion is synonymous with despotism, and that liberty is identified with infidelity, the Czar is eager, of course, to crush the brave defenders of liberty in France, Italy and Hungary. He rushes to the assistance of Austria in her villainous attempt to crush the brave Hungarians, and claims that his interference is a religious act.

And even in this country, so strong are our sympathies with all the corruptions of Europe, the magnificent scoundrelism of Nicholas meets with a friendly response. The editor of the Freeman's Journal of New York, says:

"The Emperor of Russia has girt on his sword and shouts for the battle. Our sympathies for liberal reforms in Europe have indeed been schooled and chastened, as well as mortified, from what they once were, when we can bring ourselves to look on the grim step of the Autocrat, and say: Let him forward in the name of God! But if we have little confidence in the word or promises of princes, we have full confidence in the thorough rascality and turpitude of mobs and radicals. They are hopeless, and Europe is overrun with them. The proclamation of the Emperor Nicholas is moderate in temper, and just in its principles and conclusions. He has been lawfully invited by the Austrian government to enter the territory of the latter, and help to rid the world of vipers too pestiferous and disgusting to be longer endured in society. Whether, by a marvelous conversion from the accursed blackness of his past life, the Czar is indeed coming down to vindicate justice and to maintain the rights of society; or, whether, like a second Attila, he is coming as 'the Scourge of God,' we concede that his presence has become necessary, and we wait to see him accomplish whatever 'the Almighty Hand that overrules him shall permit.'"

Notwithstanding this open avowal of sympathy with that most villainous form of despotism which cloaks itself under the garb of religion, but few of our political newspapers have had sufficient manliness to notice and rebuke this language as it deserved.

The principal cause, no doubt, of these monarchical sympathies is found in the fact, that the Catholic church of Europe, through its head the Pope, has been arrayed against the cause of freedom. The attempt of the Pope to subjugate the Roman republic, utterly disregards the inherent right of the people to self-government. With the assistance of the French he has earned a bloody triumph over the brave Romans, whose heroic energy revived for a time the glories of the ancient republic. Sectarian attachment to Pius the Ninth as Pope, has led Catholics, even in America, to befriend and even assist him in his war as monarch of Rome against the freemen

of that republic. Money has been sent to his assistance. Thirteen hundred dollars are said to have been sent from this city! At the same time, either through general apathy or through the dread of Catholic influence, our countrymen who manifested so lively a sympathy with the struggles of France and of Ireland for freedom, have scarcely given a single token of sympathy with the brave Roman republicans; nor has our government, by any act of recognition, cheered them in their desperate struggle. Why is this? Are we already secretly controlled by a sectarian influence in this republic?

Bombardment of Rome.—The following letter from Father Ventura, a distinguished Catholic priest at Rome, a friend of O'Connell and liberty, discloses one of the most interesting aspects of European political revolutions. The letter was translated by Rev. G. H. Hastings for the New York Evangelist.

Ventura's Letter.—"It is with a fearful and bleeding heart that I now address you. Even as I write the French are bombarding Rome, destroying its monuments, and raking its people with grape-shot; blood flows freely on every side; ruins are heaped upon ruins, and God only knows the issue of the lamentable conflict. Some fear that if the French enter Rome by assault, the people will be led in their rage to murder the priests and recluses. In such a case, what a glorious victory would the French obtain! What a fine restoration of Papal sovereignty would she effect! History teaches us that, in general, restorations effected by force are not durable, and that thrones raised upon dead bodies and blood are fated to be overthrown by yet more violent convulsions. Of all the expedients for the restoration of the Pope discussed at Gaeta, they have chosen the most deplorable.

"But what most distresses the heart of every Catholic, is this restoration, supposing this to be effected without firmly establishing the power of the Prince, will wound and perhaps destroy the power of the Pontiff. The cannon now working destruction in the walls of Rome, is as steadily destroying the Catholic faith in the hearts of the Romans. I have already told you what fearful impression the '*Confetti di Pio Nono mandati a suoi figli*'* have produced upon the Roman people—what hatred they have excited against the priests. But all this is nothing to the rage which the sight of French bombs has awakened against the church, even against the Catholic religion; as most of the bombs have fallen in the suburbs, ruining the houses and wounding the families of the poor people, that portion of the Roman people formerly the most devotedly Catholic, who now curse the Pope and the clergy, in whose name they see these horrors committed.

"I am far from believing that Pius IX wishes these things, or that he even knows of them. I know that he is kept in such a

* "The sweetmeats sent by Pius IX to his children;" a motto written upon the cannon balls of the French, which were borne about the city in processions.

state of isolation, that the truth in these matters cannot reach him; every thing is perverted before he receives it. I know that the poor Pope, surrounded by wicked or imbecile men, sentenced, as it were, to the depths of a citadel, is well nigh a prisoner, and very little master of himself. I know that they take advantage of the feebleness of his character, of the tenderness of his conscience, of his state of nervous excitement, which subjects him to whatever influence or impressions his courtiers please.

"But what I know and believe, the Roman people do not know nor believe. The people know only what they see and suffer. They see that the Austrians, with a prelate of the Pope, Monsignor Benini, in the midst of them, ravage the Legations, bombard cities, levy enormous contributions upon the most peaceable citizens, exile and shoot the most ardent patriots, and re-establish everywhere clerical tyranny. They see that the Pope has launched against the Roman State, as against some wild beast, four great powers, armed with all means of destruction; and they will listen to nothing; they rise against the Pope and the Church in that very name, and in defense of those very interests, by which the Pope declares it his duty to re-conquer forcibly his temporal power. Mr. Harcourt, in a letter dated Gaeta, writes, 'Reason and charity are banished alike from Rome and Gaeta.' In those few words we have the history of the last seven months. The excesses of Rome, which no one pretends to justify, although to a certain degree necessary in times of revolution, have been surpassed by the excesses of Gaeta. Not a word of peace, of reason, of pardon. Not a promise to maintain public liberty, such as we had a right to expect from a Pope, and especially from the mouth of Pius IX, has come from that rampart of absoluteism, that rendezvous of folly and wickedness, combined to smother the sentiment of charity and love in the amiable heart of Pius IX.

"I have just read the last address of the Pope to the Cardinals. What impudence! what folly to have put into the mouth of the Holy Father pompous eulogies of Austria and the King of Naples—the greatest enemies of the independence of Italy, whose very name horrifies every Italian! What impudence to have made the Pope say that he himself appealed to the powers to reinstate himself on the throne which he himself abandoned! It was to say, 'I intend to wage against my own people that war which the year before I said I would not wage against the Croats and Austrians, the oppressors of Italy.' Even the women raise this reproach against him; and now, in witnessing the effects of this savage war of four powers against one little State, in seeing their husbands and children killed and wounded, you cannot conceive the rage of the women, the violent sentiments to which they give way, the cries of fury which they vent upon the Pope, Cardinals and Priests, *en masse*. From this you may well conclude that the people have abjured the churches. They will neither confess nor communicate, nor assist at the mass, nor hear the word of God. One cannot now

preach at Rome for want of hearers. No one wishes any thing at the hands of a priest, or any thing priestly.

"To me Pius IX is still and ever the Vicar of Jesus Christ—the head of the visible church: the master, the teacher, infallible interpreter of the rule of faith and practice. The weakness, the faults even of the man, cannot make me forget in him the high prerogatives of the Pontiff. But can the people comprehend this? Can the people rise to, and abide by, these theological distinctions? Alas! To the minds of the people, the crimes and cruelties of the man are the crimes and cruelties of the priest; the faults of the king are the faults of the Pope; the infamies of politics, the effects of the doctrines of religion.

"My friends endeavor to conceal from me what is said and done in this deplorable scene at Rome. They spare me the grief which such things must necessarily cause me. But in spite of their care, I learn that the whole youth of Rome, and all men of intelligence, reason thus: 'The Pope means to reign over us by force; he claims for the Church, that is for the priests, the sovereignty which belongs only to the people; and he believes, he says indeed, that it is his duty to act thus because we are Catholics, and because Rome is the center of Catholicism. Very well, what is to hinder us, then, from becoming Protestant if necessary, and then what political right can he have over us? For is it not horrible to think of, that because we are Catholics, and sons of the Church, we must be mastered by the Church, abjure our rights, receive from the liberality of the priests, as a concession, what is due in justice, and be condemned to the lot of the most miserable of people?'

"I find these sentiments have become more common than is generally supposed; they have penetrated even into the hearts of the women. Thus twenty years of apostolic labor which I have endured, to attach the Roman people to the Church, are sacrificed in a few days! Behold what I have foreseen and predicted in all my letters, come to pass! And even beyond my first forebodings! Protestantism is, in fact, now planted among a portion of this good and religious Roman people; and horrible to tell, this has been brought about by the priests themselves—by the miserable politics into which they have led the Pope. Ah! my dear friend! the idea of a bishop who rains grape shot upon his diocess—of a shepherd who cuts the throats of his sheep—of a father who devotes his children to death—of a Pope who means to reign, to impose himself upon 3,000,000 of Christians by force—who means to establish his throne upon ruins, corpses and blood! This idea, I say, is so strange, so contrary to the letter and spirit of the Gospel, that there is no conscience which does not revolt at it—no faith which can bear up against it—no heart which does not groan at it—no tongue which is not moved by it to cursing, aye! even to blasphemy! Ah! better, a thousand times better, have lost the temporal power, the whole world if necessary, than to have given such a scandal to his people.

"Oh, if Pius IX had been left to himself—had he only been able to act according to the dictates of his own heart! In the first place, he would never have left Rome; or, if driven to that, he would never have quitted the Roman States. He would have gone to Bologna, or to Ancona, or Civita Vecchia, where he would have been received as the messenger of Heaven. There he would never have rejected the deputation sent by the city of Rome; thence he never would have launched the excommunication which has driven from the *Constituente* all men of timorous conscience—all his friends. Counseled to provoke the armed interference of the powers, he would have answered: 'What is but indifferent in a Prince, is scandalous for a Pope. It shall never be said that Pius IX made war upon his own people. I will never recover by force what I can only possess in love. I will never consent that any one shed for me a drop of the blood of my children. Exile, a thousand times exile, and for life even, rather than appeal to the bayonet and cannon, which, in subjecting my people to me, deprive me of their love, and repel them from the Church and religion.' Oh, if Pius IX had but held this language! Had he but thus addressed himself to the Roman people, they would have risen *en masse*—they would have sought out the Pontiff—they would have brought him back in triumph—they would have been happy to live under such a Prince. It was the surest, the most effective means of creating and establishing reaction. But this appeal to war, the presence and the horrors of combat, instead of producing reaction, have enfeebled, disarmed, annihilated it. Even those who were formerly for the Pope, now deem it just and honorable to answer war with war. They have repudiated Pius IX as King, and begin now to renounce him as Pontiff.

"It is probable that Rome will fall under this attack of the French. How resist France? It is possible that the Pope may enter Rome bearing a sword instead of the cross—preceded by soldiers, as if Rome were Mecca, and the Gospel the Koran. But he will never reign again over the hearts of the Romans. In this respect his reign is destroyed—finished forever. He will be Pope but to a small number of the faithful. The immense majority will remain in fact Protestants. They will practice no more the Roman Catholic religion, so great will be their hatred of the priesthood. Our preaching will be of no effect. It will be impossible for us to cause the Catholic Church to be loved, or even tolerated, by a people who will have been taught to hate and despise it in a chief imposed upon them by force, and in a clergy dependant upon this chief. It will be impossible for us to persuade them that the Catholic religion is the mother, the instructress, the guardian of the liberty of the people, and the guarantee of their happiness. Those best arguments, those most in vogue to-day, those which alone are relished by the people—the arguments of facts, by means of which for two years we made religion to triumph over the most rebellious minds and hardest hearts—those arguments are now forever taken

from us. Our ministry will become sterile, and we shall be hooted and despised where we are not pursued and massacred. The French, in this fratricidal war, have left upon history one of those bloody pages which humanity and religion must expiate through long ages."

FREEDOM IN EUROPE.—It is now an agonizing time for the patriot. Ireland lies in the torpor of death. France is slowly relapsing from republicanism toward monarchy; Jesuits are managing her policy. Rome is enslaved, though Garribaldi and his little army are not yet captured. Venice holds out against her Austrian besiegers. The Hungarian Republic, led by the immortal heroes, KOSSUTH, Gorgey and Bem, is engaged in a terrible death-struggle with the myriads of Russia and Austria. "How long, O Lord! how long!" shall the blood of the martyrs still flow for the salvation of mankind?

THE NEW YORK TRIBUNE.—This able newspaper, which stands in the very front rank of the American press for ability, boldness, philanthropy, liberality and general intelligence, contains a notice of the Journal of Man about a column and a half in length, in its number of June 25th. The notice is of the candid and liberal character which might be expected from such a source. It is quite refreshing, when there are so much flippant denunciation and so many reckless tirades in the columns of our political press, to find in the Tribune such a genial humanity inspiring its articles, and to read its graphic sketches of the progress of revolutions and the spirit of liberty in Europe. Every lover of liberty and humanity, who is interested in the struggles of mankind against all forms of wrong and oppression, should read the Tribune.* The following extracts exhibit the liberal spirit of its notice of the Journal. What a contrast it presents to the coarse slang and vulgar buffoonery with which many of the leading scientific and political journals of this country and Europe receive every similar scientific innovation:

"The editor of this work is known as an original and devoted inquirer on subjects connected with the higher problems of anthropology. The fruits of his long continued researches are presented in this Journal, with such illustrations and arguments as are requisite to adapt them to general comprehension, and secure to them that attention which their novel and exceedingly curious character would seem to demand of the intelligent reader. Dr. BUCHANAN presents his discoveries with great confidence in their truth and importance, though he is free from the arrogance and pertinacity which so often attend the announcement of unrecognized facts, and which contribute so much to prejudice the public mind against their reception. His method is strictly scientific; he proceeds on the sure

* The Weekly Tribune is published at $2,00 per annum (in advance), the Semi-weekly at $3,00, the Daily at $5,00. Its circulution, in the aggregate, amounts to between forty-three and forty-five thousand.

ground of observation and experiment; he admits no phenomenon as reality which he has not thoroughly tested; and is evidently more desirous to arrive at a correct understanding of Nature than to establish a system. We do not profess to have received the principles which he sets forth with so much plausibility; it has not been in our power to give them sufficient examination for that purpose; but they are sustained with so much strength and candor by their author, that we do not hesitate to bespeak for them a fair hearing before the tribunal of the public.

"* * * * * * We wish only to draw attention to a very singular order of phenomena, which come to us authenticated by unexceptionable evidence. We do not pronounce on their character or claims. They may be classed among the numerous startling disclosures of modern science, on which the wise man prefers to suspend his judgment. We rejoice that they are in the hands of one who is so well qualified as the editor of this Journal to do them justice, both by his indomitable spirit of research, his cautious analysis of facts, and his power of exact and vigorous expression."

Miss Blackwell, formerly of Cincinnati, where her friends still reside, and who graduated an M. D. at the Geneva (N. Y.) Medical College, is still pursuing her professional studies in Paris. A letter from Paris says:

"The medical community of Paris has been set a-talking by the arrival of the celebrated American Doctor, Miss Blackwell. The lady has quite bewildered the faculty by her diploma, all in due form, authorizing her to dose and bleed and amputate with the best of them. Some of them are certain that Miss Blackwell is a Socialist of the most furious class, and that her undertaking is the entering wedge to a systematic attack on society by the fair sex. Others who have seen her, say that there is nothing very alarming in her manner; that, on the contrary, she appears modest and unassuming, and talks reasonably on other subjects. The ladies attack her in their turn. One of them said to me the other day, 'Oh, it is too horrid; I 'm sure I never could touch her hand! Only to think that those long fingers of hers had been cutting up people!' I have seen the doctor in question, and must say, in fairness, that her appearance is quite prepossessing. She is young and rather good looking; her manner indicates great energy of character; and she seems to have entered on her singular career from motives of duty, and encouraged by respectable ladies at Cincinnati. After about ten days' hesitation on the part of the Hospital of Maternity, she has at last received the permission to enter that institution as a pupil."

Mesmeric Institute.—The people of Bristol, England, have founded a Mesmeric Institute, of which Earl Ducie has become President. Many of the English nobility are believers in and advocates of the system.

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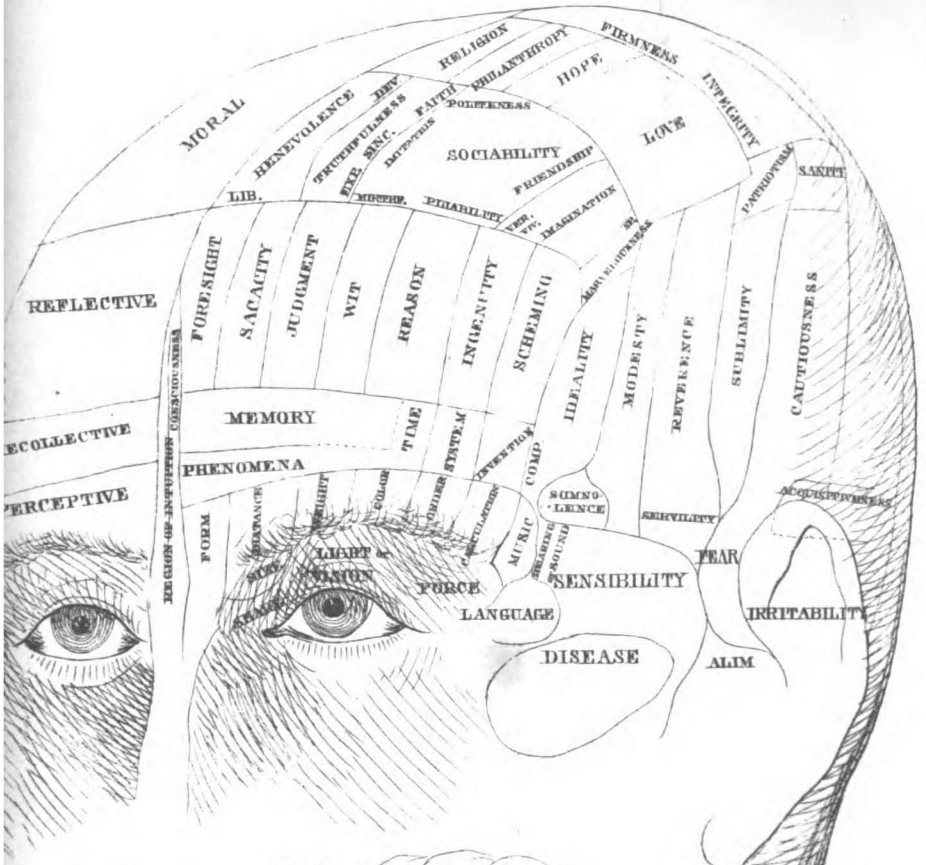


Fig 1.

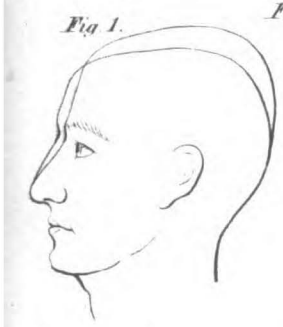


Fig. 6.

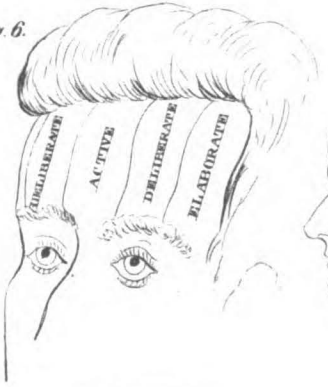


Fig 2.

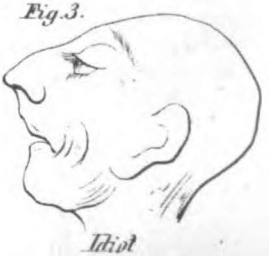
Webster.

Dr Sam.l Johnson.

Fig 5.

Boswell.

Fig.3.



Idiot

M'Brair.